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## SUBSCRIPTIONS

Members are reminded that subscriptions for 1981 are now due and are as follows:-

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AUSTRALIA.

## PUBLICATIONS AVAILABLE

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| Graeme Henderson, The Wreck of the Elizabeth | $3.00 (Members $2.50) |
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| Lithgow Pottery. A Source Book (Part I) | $3.00 (Members $2.50) |
| Lithgow Pottery. A Source Book (Part II) | $5.00 (Members $3.75) |

Postage 50¢ per publication.

## I. EDITORIAL

The continuing surge of activity in the field of Historical Archaeology shows no sign of slackening. Some of the more notable activities of recent and forthcoming weeks are here listed:

February 20 -25 — Seminar on Victorian Interiors (Faculty of Architecture, University of Melbourne, Convenor Dr. Miles Lewis). Extremely impressive with visits to surviving fine Victorian interiors and live demonstrations by master craftsmen on the arts of wall and ceiling stencilling and wood graining. Also excellent bibliography of I9th century source books. (Organiser Dr. Miles Lewis).

March I4 (one day) — Seminar Introduction to the Conservation of the Man Made Environment, Faculty of Architecture, University of Sydney. Intended for postgraduate students from architecture, archaeology, history, engineering etc. entering courses in conservation at Sydney University, Faculty of Arts ( MA in Historical Archaeology), Faculty of Architecture ( MA in Conservation), and UNSW ( Graduate School of the Built Environment) as a general introduction to facts and case studies in conservation problems. (Organisers Howard Tanner, J. Birmingham).

February-April(end) — The large scale excavation at Hyde Park Barracks to salvage archaeological information from below-floor and ground deposits prior to installation of the air conditioning plant necessary for the conversion to a museum proceeds with vigour and efficiency under Tricia Burritt's professional direction. Volunteers are welcome each week-end (Friday - Monday inc.); report to dig office at Barracks any time after 6.30am, or ring 24I 2II4

Brisbane May — ANZAAS (II-I5), Australia ICOMOS (I6-I9), and the Engineering Heritage Committee (II- I5, but principally May I4). All have programmes of papers, discussions and tours. Details of membership or participation from Professor R.L. Whitmore, Dept. of Mining and Metallurgical Engineering, University of Queensland, ST. LUCIA, Q. 4067, on various aspects of historical and industrial archaeology. Tours of local and more distant sites are available to participants.

For details of the following see inside:

- Heritage Week
- Historic Photographs Conference,
- Industrial Archaeology, Week-end Seminar and Lecture ( with Dr. R.A. Buchanan).

Issues such as the Intercontinential Hotel next to the Treasury Building, the new Stadium at Cumberland Oval, and the Washpool logging controversy at Grafton give added significance to Heritage Week, March 23-29, I98I. Please support it in every way- IF YOU FEEL STRONGLY ABOUT A SITE OR ISSUE, WRITE A LETTER TO THE PREMIER FOR HERITAGE WEEK.

## II. NEWS ITEMS: GENERAL & FORTHCOMING EVENTS

### Mallard Film: 'The Building of the Sydney Harbour Bridge'

On Thursday, 12th March, 1981, there was a public showing of the above film at the Institution of Engineers Auditorium, Milsons Point. The popularity of the film has now established it as an annual event.

In the mid-1920s the Sydney photographer Henri Mallard obtained the agency for a brand of home movie camera. Seeking a means of demonstrating the capabilities of the equipment, he realised that, virtually on his own doorstep, there was a construction project that had gripped the public imagination. After some difficulty, Mallard obtained permission to risk his neck on the construction site - which he certainly did - and the result is a valuable part of the pictorial legacy of Sydney.

After Mallard's death in 1967, his estate included two copies of the 1½ hour silent film, each on two 16 mm reels. One copy was given to the National Library and the other to the Sydney Division of the Institution of Engineers, Australia. The Department of Main Roads also has a copy of the film which they claim was made from the original version of eight 35 mm reels.

In 1971, Professor D. Campbell-Allen of the School of Civil Engineering, University of Sydney, then Chairman of the Sydney Division of the Institution, invited Mr. Frank Litchfield to the School to view the film and to comment throughout its showing, these comments being recorded on tape. The late Mr. Litchfield was assistant to Dr. J.J.C. Bradfield of the Department of Public Works, New South Wales, who, as Chief Engineer, Sydney Harbour Bridge and Metropolitan Railway Construction, was responsible for the supervision of the construction of the bridge. Mr. Litchfield was therefore in regular contact with all aspects of the work and with the different sectors of personnel related thereto including Mr. Lawrence Ennis, Director of Dorman, Long and Company, the constructors, and with Mr. Ralph Freeman, the designer of the Bridge. The recording of Mr. Litchfield' s remarks - which has not yet been printed onto a copy of the film - when played back in synchronisation, provides a fascinating record of the work and, incidentally, a startling demonstration of the ability of the human memory over a time-span of forty years.

The de Groot incident at the opening ceremony was edited from the film by Mallard who was apparently quite disgusted by such antics.

Connoisseurs of Sydneiana may already by familiar with the book of Mallard's still photographs: 'Building the Sydney Harbour Bridge', published by Sun Books, Melbourne, in 1976. On the back cover of the book is a photograph of Mallard holding what is unmistakably a movie camera: doubtless the one used for this particular film.

I.G.B.

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### HERITAGE WEEK - 23-29 March, 1981

The first Heritage Week was held in Victoria in March 1980 at the instigation of the National Trust of Australia (Victoria). Its success has led to Heritage Week 1981 in New South Wales and to plans for a National Heritage Week in 1982. Heritage Week will be launched on the evening of Monday March 23, 1981 by the Honourable Neville Wran, Q.C., M.P., Premier of New South Wales and will provide an opportunity for the people of New South Wales to discover more of the richness of the environmental and cultural heritage of their State.

Heritage Week Programmes may be obtained from:

Mrs Celia C. Wade
Executive Officer
C/- National Trust of Australia (N.S.W.)
Observatory Hill,
SYDNEY NSW 2000 Telephone: 27 5374

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Public Lecture - 'Our Industrial Heritage' - Saturday, May 2 1981

You are invited to attend a lecture 'Our Industrial Heritage' to be given by Dr Angus Buchanan, a distinguished visitor from the School of Humanities and Social Sciences, University of Bath, England and who is at present lecturing at the Research School of Social Sciences, Australian National University.

Date May 2, 1981

Time 7.30 p.m.

Place W.E.A. House
72 Bathurst Street,
SYDNEY

Entrance fee 50¢ which includes supper

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Historic Photograph Conference

The Historic Photograph Resource Project of The University of Sydney is organizing a two-day conference to be held at the National Trust Centre, Observatory Hill, on the weekend of April 11th - 12th. The title of the conference is "Conserving Historic Photographs". It will consider where historic photographs are located, how a central directory of photographs might be compiled and how individual collections of old photographs should be indexed and stored safely.

Project Officers Barry Groom and Warren Wickman were concerned that old photographs were being destroyed and for this reason commenced the project 10 months ago. It has, since then, grown into an established centre for historic photographs and is co-ordinating the conference.

At the conference a series of papers and workshops will be given concerning the value and use of historic photographs and ways of improving protection for them. If you would like further information on the conference, please contact Barry Groom or Warren Wickman on 692 2274 or 692 3739 or write to them c/- Department of Historical Archaeology, University of Sydney, 2006.

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The Society is pleased to announce receipt of a third royalty cheque for US$117.98 ($AUS.99.78) from sales of Historical Archaeology. A Guide to Substantive and Theoretical Contributions Ed. Robert L. Schuyler ($US15.00 + $US1.50 postage, Baywood Publishing Co. Inc. Farmingdale, New York, 11735).

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## III. BOOK REVIEWS AND RECENT PUBLICATIONS

AUSTRALIAN PIONEER TECHNOLOGY : SITES AND RELICS, by Judy Birmingham, Ian Jack and Dennis Jeans (Heinemann Educational Australia, 1979), 200 pp., ill., Aust. 29 dollars.

Economic development and technological transfer in the nineteenth and twentieth centuries has created in Australia an industrial heritage of unparalleled importance. The urgency which characterised much of the work of the industrial archaeologist in Britain during the early 1960s is only just making itself felt in Australia in the 1980s. Now there is a growing awareness of the importance of industrial sites and artefacts for their own sake, rather than adjuncts to investigation and conservation of early colonial sites. This new awareness partly reflects a mounting enthusiasm for an Australian history and national identity.

Australian Pioneer Technology, from the firmly established Sydney University stable of historical archaeologists (an American label admirably suited to the Australian context) is therefore a timely and important book. It provides a superbly illustrated introduction to the vast wealth of industrial archaeology that survives in almost every corner of this vast continent where men have exploited timber, minerals, power, and other natural resources. Somewhat modestly, Ian Jack in the introduction makes clear that this book 'is no more than a pioneer guide book for those who wish to understand and enjoy the tangible relics of Australia's past'. He indicates that industrial archaeology in Australia in still 'in a pioneer stage of defining the task and techniques appropriate to the evidence available'. In Australia the main theme of industrial archaeology is certainly the impact of the overseas Industrial Revolution on the process of economic development and settlement, so there is considerable concentration on imported equipment and technology, and how these were adapted to Australian requirements. Jack's subsequent discussion indicates the diversity of approaches adopted in documenting something of this legacy - approaches which have included both field survey and (by British standards) a remarkable amount of sophisticated excavation. The concentration here is essentially on primary industries, the farm, the mine, and some of the associated industries and technologies. A further book from the same team will discuss secondary and tertiary industries.

Dennis Jeans, an historical geographer, contributes a chapter on rural technology, the machinery fundamental to the development of the nineteenth century agricultural economy . Although much was imported from Britain and the United States many imp lements were either adapted to or developed specifically for Australian conditions. The stump-jumping plough, for example, was an ingenious device introduced in 1876 which made it possible to attack newly cleared land containing heavy roots. Apart from other implements of grain technology this chapter includes power sources, dairying technology, and sugar processing machinery. Although inevitably much has been scrapped over the years machinery of this kind is now being collected for display in a growing number of local pioneer museums.

Further studies by Judy Birmingham reflect other aspects of the agricultural theme. Relics of widespread sheep and cattle rearing include stock routes, water tanks and wells, while the meat processing trade has left countless boiling down sheds, meat canning factories, cool rooms, freezing plant, tanneries and tallow works. The former ice and freezing works at Bateman's Bay (N.S.W.) contains 11 km of pipes which circulated ammonia to make ice and cool the storeroom and dates originally from 1886. Australian vineyards often preserve much ancient equipment usually well-displayed for visitors, though much of the nineteenth century industry still needs recording. Australia has lost almost as many breweries through rationalisation as Britain, so survivals like the splendid Swan Brewery in Perth (W.A.) with its associated maltings and bottling plant, are worth preserving as outstanding examples of Victorian industrial architecture. The timber industry has also left a remarkable legacy of abandoned milling settlements, plant and bush railways, notably in Tasmania, New South Wales and Western Australia.

If pastoral activities and the exploitation of primary products formed the backbone of Australian economic development in the nineteenth century, it was the mineral boom which acted as the real catalyst to growth after the 1850s. The five chapters by Judy Birmingham and Ian Jack indicate the dramatic archaeology of gold,

copper, lead, iron, coal and shale oil exploitation, which now desperately needs detailed recording throughout Australia. The wealth of mining material would stagger European field workers, a richness which is often a function of isolation and wholesale abandonment when ores were exhausted. Gold mining has left a remarkable diversity of relics. Among the most dramatic sites are at Hill End (N.S.W.), Steiglitz and Castlemaine (Victoria), and the later but impressive Kalgoorlie-Coolgardie Gold Fields district of Western Australia. At Ballarat (Victoria) the Sovreign Hill Museum recreates a complete mining community of the Gold Rush era, a most imaginative venture which some might argue is historical reconstruction rather than industrial archaeology. But its success, like that of Ironbridge, is the essence of the educational function of museums, in bringing the past to life in an enjoyable way. Apart from gold, other mining activities have left a fascinating heritage. Cornish, Welsh and Scots played a notable role, greatly influencing both technology and settlement patterns. There is a certain fascination (as I myself experienced) in discovering a Cornish engine house or an abandoned Methodist Chapel in the middle of the Australian bush! Relics like this say more about Australian history than all the pretty Colonial housing so loved by certain conservationists. It might be said that a large-format book attempting an inevitably broad coverage ought to have waited until something like a basic record had been completed for the whole of Australia. Although I heard such criticisms of the Birmingham, Jack and Jeans approach voiced by some practitioners, there is little doubt that Australian Pioneer Technology will succeed in drawing public attention to the major task which lies ahead. Many in Britain were critical of Kenneth Hudson's approach in the early 1960s, yet his work did much to popularise industrial archaeology and to heighten public awareness. What is needed in Australia now is a concerted attack on the problem of a national record of industrial monuments. This will only be achieved by a co-ordinated effort on the part of Commonwealth and State conservation agencies, heritage groups, museums, local societies and individuals - perhaps working through some national agency.

I.D.

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The Lithgow Pottery, by Ian Evans. The Flannel Flower Press of Sydney 1980. 176 pages, 264 illustrations (120 in colour) Limited edition of 2000 copies Recommended Retail Price $49.95. Deluxe edition 200 copies with Lithgow pottery medallion by Bob Cunningham $175.00

Timed for the centenary of domestic pottery production at Lithgow by employees of the Lithgow Valley Colliery this handsome book is a most welcome addition to the growing body of books on Australian 19th-20th century pottery. It gives a detailed and fascinating history of the company, from the first demonstrations of the energetic young potter James Silcock fresh from England to the inevitable decline in the 1890s. Particularly interesting is the comparatively little-known material on the Brownfield period (1905-7) which at last ensures due credit to the talented Arthur Brownfield. The book is a pleasure to look at with its rich use of illustration - old views of the pottery works, former workers, advertisements, catalogues, potters tools a wide range of brand stamps and above all the rich diversity of the pottery itself in glowing colour.

J.B.

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## IV. REPORT ON ADELONG GOLD FIELD, COUNTY WYNYARD AND MINING DISTRICT TUMUT AND ADELONG

### 1. Sources

Most of what has been written in the recent past about Adelong has been drawn largely either from L.F.Harper The Adelong Goldfield (N.S.W. Department of Mines and Mineral Resources No. 21, 1916) or from articles written by William Carter in The Australian Magazine 1910 and in the Sydney Morning Herald in 1929. Most of what is included in the Adelong and District Society Bulletins has been drawn from these sources as have the material and pictures in R.J.Bird, Adelong: Glimpses of the Past (1976).

Harper's main concern was principally and properly an assessment of the then future prospects for the field as a gold-mining area in 1916 and for his historical background he relies almost exclusively on W.Slee's report as inspector of mines in 1876 and on what the manager of the Gibraltar mine told him. He provides a map indicating the main lines of reef and another showing the reef claims as they are reported in Slee. He also provides an underground traverse and plan of the Gibraltar Consolidated Gold Mining Company's mine which had been just closing down when he visited it, but says that it would be impossible to examine the underground workings in any of the other reefs where all the mines 'have been long abandoned', so he simply assumed that the same general principle of ore bodies applied there as applied to what he had allegedly seen in the Gibraltar mine.

Carter is in general understandably more interested in colourful gossip than in technical details though the articles provide some information about operations, some of which may be genuine oral tradition from people now dead.

It is clear, however, that none of these sources can be treated as gospel, nor are they adequate if a serious attempt is to be made to reconstruct the changing forms of land exploitation in the area. Harper, for instance, can be demonstrably misleading. He says 'There was an old-fashioned public battery at that time (it is not in fact clear precisely what time he has in mind) with ten head of wooden stamps shod with iron weighing 160 lb. The ore was passed over plates into a Chilean mill without mercury so that only the free gold was recovered...the sulphides emptied into the creek'. In fact, no battery I have yet identified had precisely that number of heads at that weight, though any battery might have had only that number operable at a particular time. More to the point, it is clear from the start of reef operation and the earliest (1858) issues of the Adelong Mining Journal that all the named batteries were private ventures crushing for the public at a given fee (earlier per ton, later by the hour) and so public only in the sense that they were not the exclusive preserve of any one company. They were also from the start using mercury although there were brief unsuccessful experiments without mercury which showed by their disastrous returns that the method was impracticable with Adelong conditions. Indeed a shortage of mercury was from time to time the reason for the batteries being at a standstill.

There are various other sources which would need to be systematically tackled if a proper study is to be made. There were a number of general mining maps available to the public in the 1880s and after (the Adelong maps in the 1880s were numbered 63 and 64) but the detailed maps of mining leases at the department of mines would need to be examined. Leases were numbered and had to be published so that lists can be compiled from the papers with some idea of their location and details of their size, but this is not fully satisfactory as the following example may show (published in the Australian Town and Country Journal 22 January 1876):-

Tumut and Adelong

| | | | | | | |
|---|---|---|---|---|---|---|
| 72 213 | Thomas | Norton | Gibraltar | Hill | Adelong | 25 acres |
| 72 299 | " | " | " | " | " | 5 acres |
| 72 445 | " | " | " | " | " | 4 acres |

Precise boundaries cannot be established in this way, nor can the often more critical facts relating to water rights and the course of the water races built.

The reports of the local mining wardens can also be fruitfully used and the day books and other reports and records kept, if they have survived for Adelong which I have not yet ascertained. Again the reports may diverge quite widely from one another even when two people are reporting on the same set of facts. Thus the regional supervisor of the Adelong and Tumut area is always more pessimistic than the local warden.

There are a number of local papers which can be stripped for information. This would appear to have been done for Adelong as the Mitchell holds (at A3621) a four volume typescript in chronological order from 1824-1937, done by Mr. Perkins. A cursory examination however suggests that he was more interested in births, marriages and deaths than in the techniques of mining and the location of plant which is our immediate concern, so the papers may well need to be rechecked.

Photographs seem at present to be in short supply. Harper includes a number of quite useful photos from 1899 on. The Mitchell small picture file has pictures of the dredges from the Sydney Mail Sept 8 1900. The Government Printer claims to have no photos of Adelong at all nor of the major mines or batteries named to him though this may not be entirely true as the system is a trifle idiosyncratic.

A careful historical study by a qualified historian of the records which survive would be necessary to provide the foundations for any archaeological investigation or reconstruction that was attempted. I would calculate that it would take at least two months and would therefore cost in the region of 1,500 dollars. I would not recommend any short cut as this would probably merely waste the money actually spent. The sources are there but they are tricky to use and time consuming to co-relate if complete accuracy is required. It must be remembered that this was ground that was intensively used and re-used over a seventy year period.

At the same time there are still locals alive who may remember the very last days of the Gibraltar mine and the dredges. One man who worked on the dredges and should be contacted quickly is: Alvy Miller, Mount Horeb, via Adelong.

## 2. Reasons for Conserving the Goldworkings at Adelong

E. F. Pittman in 1916 describes Adelong as 'typical of a number of goldfields opened soon after the discovery of gold in Australia and which enjoyed a large measure of prosperity for a time to be followed by a period of depression'. Adelong is typical in some ways but in others it is a microcosm of different techniques from different periods which are rarely if ever all found in the same small compass. Few, if any, goldfields can match the range of activities that Adelong provides. From the early days of panning the working of the alluvial deposits saw every variety of process. The reef mining showed the same span from the days of horse whim and bucket on. The alluvial mining passed through the stage of framing and slabbing with pumps that threw up one ton of mud a second, through extensive underground mining of the deposits and a period of experimentation with high power hydraulic nozzles and pump machinery to the dredging which dominated the first decade and a half of the twentieth century before the First World War.

Quartz mining gradually improved its machinery both in the mines and in the batteries although, interestingly, the Wilson and Ritchie battery retained its waterpower to the end, while at the Gibraltar battery there was the most modern equipment. Adelong stone was particularly hard and the small

quantity of free gold meant that a lot of local experimentation went on, in conjunction with great interest in outside new methods. At some stages the field could boast the most up-to-date machines in the colony in crushing, alongside some of the most primitive methods in mining.

3. Visible Remains

There are a variety of walls and footings, remnants of wheels and chimneys, expecially in the vicinity of the Wilson and Ritchie battery and the Gibraltar works. These are not necessarily a simple matter to 'read' since they are the result of various different epochs, rebuildings, alterations and extensions. Some carefully thought out conscious decisions will have to be taken if the site is to be conserved and the National Trust (N.S.W.) would presumably wish to be involved in any discussions as to what should be done. The goldworkings at Adelong Falls are subject to an Interim Conservation Order. The most urgent task is at present to classify the site so that any further depredations can be prevented. It should be stressed however, that the site is very like an architecturally important building which has undergone changes in the course of its history and presents the preserver with the same type of problem.

There is a problem over the area to be included in the classification. The early sites which may be of archaeological significance are on the creek right opposite the town. The Lady Mary Reef is on the other side of the town. Some of the alluvial works extend as far down the creek as Grahamstown. I would suggest that for the moment the Trust should consider classifying all that lies north of Adelong creek within the lines I have marked omitting for the moment the Lady Mary line.

4. Brief History

Alluvial gold was found at Adelong in 1853 and in 1857 the first quartz reef was located - this was later to be called the Old Line of Reef but at first was the Main Line. The lodes were in granite and quartz porphyry which was badly faulted. This was to complicate and add to the cost of all subsequent development work. The general line of the fissures in which the lenses lay was 30 to 40° W of north with a dip in a S.E. direction at 70 to 80° from the horizontal. The faulting meant that a lode could disappear without warning adding considerably to the risk of capital investment and explaining which investors did not respond as freely as they might have done to the encouraging cries of the mining inspectors that all that was wanted was the most modern equipment and some perseverance. The quartz had sulphides of iron, zinc and copper and iron pyrites which complicated the extraction of the gold (cf. E. C. Andrews, The Mining Industry of N.S.W. 1928).

By 1858 the community (claimed to be 3,000 souls) was thriving sufficiently to encourage the launching of a local weekly, The Adelong Mining Journal and Tumut Express whose first number appeared 9 October 1858. Apart from overseas and colonial news, it kept an eye on technology. The second issue had articles on the advantages of Castlemaine stamps versus Sir Colin Campbell's machine (wheels); on Kneebone and Thomas mills - said to be ingenious and compact, run by a 4 h.p. engine and Cornish boilers and working eight stamps of 350 lb. gross as well as other machinery. It also reported on a P.N. Russell new invention and plan for working a quartz crushing machine with less loss of gold. The local miners were not satisfied with the quartz crushers in Adelong, complaining both of the cost and of the 'defective process of amalgamation whereby much of the gold was lost, and also of the shortage of machines which meant that much quartz had to lie 'at grass' caus ing the miners financial problems. The quartz crushers had their own problems since they were losing an excessive amount of the expensive mercury used in the process due to the refractory nature of the ore. In 1858 15 tons of ore, and 80 lb. of quicksilver in the Chilean mill resulted in 40 lb. of amalgam (they said) which produced 60 oz. of gold and returned 45 lb. of mercury. A forty per cent loss of mercury was

hardly tolerable. At this period the ore was evidently being roasted before crushing but the journal reported on an item in the Colonial Mining Journal on a newly invented crushing machine which did not require burnt ore and not long afterwards experiments on samples of burnt versus unburnt ore were being conducted by the crushers Carmichael and Lemon and others who hoped to discover some method 'by which to nullify the properties of the mundic'.

There were numerous crushing machines on the field by this time, not always easy to disentangle as they so frequently changed hands and names and even, on occasion, locations. The first crushing machine had been 'The Pioneer', a steam machine at the foot of Camp Street (Carter says the first was Williams' but this does not seem to fit the later site of Williams' 'Perseverence' machine which was in Sawpit Gully - unless Williams had early disposed of his first). It had rapidly been joined by others. The journal describes them by going along the reef from Mr. Williams' claim. It names Edwards and Turner's ' Victoria' machine which was 6hp steam, then came Moon and Co.'s 'Union' waterwheel, a mill said to be on a different principle to ordinary crushers - it was 10hp and 'the stampers move with great velocity'. Carmichael and Lemon was another waterwheel (Carmichael was later to be involved in disputes over water rights). Also water driven were Lorenz (or Laurence) Walters German machine and Charles Wyatt's. This was not all. On the creek opposite the steam machine, a new and powerful 12hp machine was being erected for Davidson and Co. It was to include 2 pair of rollers, 6 heavy stampers and crush 70 tons a week (it was erected with a 'necessary shed' adjoining). The machinery was said to weigh twenty tons and required seven American wagons to carry it to Adelong. There was also the Reefers Quartz crushing company, managed by I. Mandelson. The Reefers and some other companies had agreed on a common tarif of £3.10.0 for mundic quartz, £3.0.0 for other quartz and £2.10.0 for lots of over forty tons. Moon however broke this agreement in the very same issue by advertising £2.10.0 for lots of over thirty tons and none under five accepted.

Carter says that the Mandelson site was near the bridge on the site of the present wheelwright's shop while the original site of the Reefer was said to be half a mile above the veteran battery. The owners of the machine included Carmichael and Lemon, Martin and Wilson. It is not clear whether this is therefore the machine also referred to as Carmichael and Lemon's. Carmichael in his dispute over water rights speaks of his dam and of other wheels being erected between himself and the dam, so this is a query which archaeological work might settle. The Reefer company took a bold step forward in the technological field when it decided to erect one of King and Holland's Patent Quartz mills (Mr. Wells had inspected one at P. N. Russell's). This was a machine which had been working on the California goldfields, not something invented in Australia (and is probably the P. N. Russell invention referred to earlier) but it was new in Australia and one of the patentees was to supervise its erection. It also brought to the field from the P. N. Russell workshop, Mr. Ritchie. It was Ritchie who was credited with eventually solving the problem of the loss of mercury. He was said to have dispensed with the revolving barrel passing pulp from the stampers and blankets to the mercury in the Chilean mill, and, by the addition of clear sharp gravel-three times the bulk of the pulp-to the mixture, restored the mercury to its clear liquid state. This however occurred well after £500 had been subscribed by crushers and miners to pay a certain Captain Richards if he could make good his claim that he could make machinery and devise a scheme to prevent the escape of quicksilver, which he evidently did not do.

Another innovation on the field at the time was the introduction of wet stampers - the 'Excelsior' machine (on Adelong creek opposite Mr. J. R. Paul's) was evidently the first and offered to crush raw mundic at £3.0.0. The Leviathan soon after ordered a new machine for another engine and eight stampe of 4cwt. each - wet stampers. Carter claims that at the height of the boom there were sixteen machines working.

Other mills erected included one of four stamps known as the 'Coffee Pot' and another called the 'Quart Pot'. The fullest description of machinery comes from the 'Prince of Wales' which was a 12 hp 8 stamp (7 cwt) mill with ordinary slides and basin and two amalgamators with a pressure of 7 cwt so constructed that no (quick) silver can escape and two shaking tables with German slides; a hopper and a self-feeder - the machinery all by Ranke and Co. of Liverpool.

One forward looking, but premature, venture at this stage was an attempt to establish a joint stock company to be known as the Adelong Quartz Mining Company to cut into the hill from near the 'Victoria' stamping machine and to emerge the other side - and solve the problem of levels while doing so. A thousand shares of £10.0.0 were to be issued. It is hard to follow the growth of companies for the buying up of claims and re-opening of shafts makes it difficult at a quick survey to follow out lines of development. There was interest by 1870 in new lines of reef especially the Gibraltar and the Lady Mary but the problems here were not solved until later - the Lady Mary in particular was subject to flooding.

By the mid 1870s there were only two batteries left, Wilson's 'Reefer' machine and the Williams battery. The latter in 1876 was connected by a tramway to its mine and was possibly not crushing for outsiders, although in theory it was and it quoted costs at so much a stamp per hour. Slee describes the Williams battery as a fifteen head battery working by water power with two of Denny's pulverisers. Wilson and Ritchie's 'Reefer' was also a fifteen head battery working by waterpower but Wilson's was regarded as better 'one of the best if not the very best on the N.S.W. goldfields'. Both had gold saving machines. A slightly later and more detailed description tells us that Williams had 50 hp of waterpower to three batteries, 2 of 6 and 1 of 4 stamps. Each box 5 foot long, with four temporary liners or iron plates to save the boxes from wear and tear and retain the amalgam (taken out at the end of each crushing). The tables were 10 foot by 4 foot with a fall of 1½ inches in the foot. There were copper plates the length of the table and at the end three ripples containing 200 lb of quicks ilver. The pulp was then taken over copper plates into the Chilean mills which are 5'8" diameter 9' wide and 2'9" apart weighing 25 cwt. The tailings after the Chilean mill pass over blanketting tables of which there were three 12' by 3'. The blankettings were put through grinding processors, two of Denny's pulverisers, which discharged outside instead of inside as is generally the case. A separate waterwheel drove the Denny's. The crushing for the public was done not by the ton but at 8d. per hour for each stamp or 10/8d. for all, the parties paying for the loss of quicksilver, and having the option of crushing with a screen grating of 196 or 169 holes per square inch.

Wilson's had only 35 hp. though it 'could be worked to 50 hp.'. Its arrangement however was said to be beautiful. The main shaft of iron connected with the waterwheel was 60 feet in length and by this shaft batteries, Chilean mills, berdans and buddle were worked. Each could be separately disconnected. The stamps were three sets of five in boxes 5'4" and each stamp weighed 7 cwt. There were other minor differences from the Williams battery; four separate copper plates on the tables, the Chilean wheel five foot in diameter by one foot and weighing 30 cwt (a grinding surface of 400 feet a minute). The berdans were improved - two berdans having a stationary chaindrag of 1½ inches grinding surface. The pulp then went into one of Munday's patent puddles 24 feet in diameter and having eight arms and eight feeders, 24 scrapers and eight revolutions per minute. The light tailings went into the creek. The savings were thought to be 9 to 14 oz. per ton. The company was erecting a reverberatory furnace for treatment of the pyrites and mundic on the principle of the furnace on the North China company mine in Victoria. Quartz was broken at the mill to the proper size for crushing.

By this time, the mines on the old reef lines were getting rapidly deeper. The 'Great Victoria' got the Government's bonus of £1000 for the first payable gold at a depth of over 800'. At this stage however most

were still using buckets and winding the slow way using horses and whims. New machinery was slow in coming. The Williams and North Williams were raising and lowering by cages and their ladderways were praised and the shafts said to be well skitted. It depended on expectations how quickly machinery was improved. When the mines were on tribute - which meant the company provided the tools, machinery, carting and crushing and took fifty percent of the gross gold that resulted - improvements were not likely. Another reason for the slow progress was the shortage of water. The cost of building tanks and drawing water for use exceeded the cost of horseflesh. For a time the only winding engine was a 12 hp. at the Adelong Goldmining company on the old reef which was installed by optimistic new Sydney owners.

By the 1880s though, the area warden was gloomy; most of the mines which were working had modern machinery including aircompressors to drive diamond drills and tramways; machinery at any one mine was generally valued at between £2000 and £3000. By 1883-4 the Great Victoria was below 1000 feet and had claimed the Government's £10,000 bonus. In 1880-1 the Perseverance Gold Mining Company erected on the banks of the Adelong creek near the Little Victoria main shaft a new battery driven by a powerful 35 hp. steam engine. It had twenty stamps in four boxes. The steam engine with its three Cornish boilers also provided power for a winding engine and steam pump to drive aircompressors. The mine was linked to the battery by a tramway and a locomotive supplied by Mort's Dock Engineering Co. operated on the tramway. In 1882 Wilson and Ritchie bought out the Williams crushing plant and water rights. This they used to extend their water race, by which they secured an additional fall of 26 feet (total available 58 feet); they now had motive power equal to 60 hp. with two waterwheels so that they used all the water twice over and had twenty stamps. The water came from a high level race of 190 yards length exclusive of an additional 150 yards of fluming and the whole was constructed at a cost of £500. As the water was obtained by gravitation 'thus dispensing with pumps' it ensured a constant flow of water to all the different gold saving appliances. Even so, the 'Perseverance' battery was evidently able to treat nearly twice as much ore - Wilson and Ritchie appearing to have a maximum throughput of under 2000 tons a year. The 'Perseverance' in 1890 had 20 head of stamps each 8 cwt. and a 12 inch drop. The crushed stones passed over two copper plates 8' square with mercury ripples, then over tables with cast iron mercury ripples thence into the Chilean mill (of which there were three) then into a Denny pulveriser, then on to a blanket table and into a Mundens patent buddle (which had plate glass scrapers, not iron).

By this time the Williams and Ritchie battery which had been on its existing site since about 1873 had reverted to fifteen head each 7½ cwt. with a 9 inch drop. The system employed was somewhat different to the Williams. After the copper plates and the ripples the pulp dropped into deep wells then went to the Chilean mill and over blanket tables and through Berdan pans. The tailings went to a Lewis and Monday's patent 24 foot buddle which had a concrete bottom and was faced with cement. The plant was driven by a 26 foot Duist waterwheel and all the machinery including the battery was driven by gearing. The race to this wheel was 80 feet giving a water fall of 30 feet. There was also an 80 foot wheel but this was only occasionally used, though the claim was still made that all the water was used twice. The pyrites was dried and sent to the Clyde chlorination works while the Chilean mill sand was run through a long Tom and the silver collected. The 'Perseverance' battery only concentrated the pyrites and sent it to Clyde, so that chlorination was not introduced on the field until the Gibraltar works were started.

In the 1880s the Lady Mary reef and the Gibraltar hill reef came into greater prominence as the others were worked out. The Gibraltar Hill Gold Mining Co. was first mentioned in 1891 by which time virtually only the Adelong Gold Mining Co. was at work on the older reefs. In 1895

the Gibraltar company was sold to an English company and about this time some very up to date plant was installed - valued at £60,000: a thirty stamp battery, 12 frue vanners, chlorination works for 100 tons of concentrate per month, cyanide works to treat 1400 tons of tailings, aircompressors capable of driving 20 rock drillers, four shafts with hoisting machinery driven by steam, two 140 hp. Lefell turbines for water to operate the aircompressors and battery, and auxiliary steam power plant. The shafts were connected with the battery by two self-acting incline tramways and the water race for the water power was three miles long. Perhaps because the other mines were mainly worked out the "Perseverance" battery stopped at about this time but the Wilson and Ritchie went on until the First World War. In technology it was no match for the Gibraltar. In 1899 the Gibraltar had again updated with two Dodge Giant rock breakers, eight Challenge ore feeders, 40 head of stamps (weight 850 lb.) with ninety drops of 7½ inch per minute and fourteen frue vanners.

Even so, by the latter part of 1901 the various mines were let on tribute until 1907. The company worked the mine again from 1908 to 1913 and again updated the equipment, but there was no dividend for investors. In 1916 when the mine closed again it had two Blake rock breakers, 40 head stamps, 4 Wifley tables, 6 cyanide vats, 2 zinc boxes, 2 UF multitubular boilers at the battery, another two at O'Brien's shaft and one vertical boiler at Perkin's shaft. The cyanide consumption at 1¼ lb. per ton was high because of the small quantity of copper in the ore.

In 1921 the New Gibraltar Company was formed to acquire the works and operate the mine. It was for a time re-opened but production was small. Tributers worked it again but by 1928 it was finally shut.

The alluvial mining followed a different pattern. From the early days when pumps were used, driven by water or steam, to pump up the slurry on small claims, it developed fairly rapidly into a large scale operation. In the 1880s it was doing well, in the hands of two companies A.D.Shepard higher up the creek and Travers Jones lower down. Shepard's was the bigger, employing 60 men to Jones' 24. The system was one of driving and blocking, working in leads as much as 48 feet deep and 300 feet wide, raising 230 trucks of wash dirt in an eight hour shift. Jones was hampered by his inability to spread further down stream where the land had been alienated. Shepard was experimenting with high power nozzles or 'hydraulic injectors' in 1885-7 to speed up the work. The new system involved blasting a 'head ram' 100 yards in solid rock and building a stone dam 1500 feet, presumably to obtain a sufficient head of water. The nozzles worked at 100 foot pressure. He had moved to the 'upper ground' where he had five shafts, two waterwheels and winding engines, with one waterwheel on the lower or old ground. Jones had to use steam and had two steam pumps one of twenty and one of twelve h.p. with an 8 inch Tangye special steam engine (valued at £3000). When Shepard finally overcame his problems, which related to the tendency of the material to slip in large masses into the cut, he kept two iron waterwheels, two turbines and two steam engines in constant use, until the alluvial deposits were worked out.

By the 1890s the main alluvial leases were used up and there was only fossicking going on. At the end of the decade, however, dredging was introduced and kept the industry going until the war. The dredge machinery can be reconstructed from the very adequate pictures in the Sydney Mail. Henry Hartnett (cf. Adelong Historical Society Bulletin No. 6) remebered it as:

> 'a large structure of wood and galvanised iron which housed all the necessary machinery and float on a man-made dam of water. A steam boiler using wood for fuel provided the power. Powerful jets of water from hydraulic hoses directed against banks of soil washed the fallen soil into long sluice boxes, gold was extracted as it passed through the sluice box and refuse was dumped'.

This made a marked impact on the landscape as can be seen from a comparison

## V. IDENTIFYING BOTTLES

*David Hutchison*
*Senior Curator of History*
*Western Australian Museum*

### Introduction

About 8 years ago, when plagued by numerous inquiries about the dating of bottles, I devised a "provisional field guide" based on a number of references (at that time principally American), some personal observation of bottles recovered from sites in W.A., and on information derived from correspondence with several people, Ivor Noel Hume of Colonial Williamsburg particularly.

The resulting key has proved useful as far as it goes. It could be improved by providing much more detail which I have not had time nor opportunity to do.

This key must, of course, be used only to obtain a first approximation to a date. We still know too little about the dates of adoption of new technologies in different factories and in different countries. A new technological development might have been adopted much earlier in America, say, than in Australia - or much earlier in one American factory than in another. There is no substitute for a critical analysis of an assemblage of artefacts from a particular site.

REFERENCES: Derry, T.K. and Williams, T.L. A Short History of Technology (Oxford U.P.)
Kendrick, Grace, The Mouth-Blown Bottle (Pub. by the author, U.S.A.)
Wyatt, Victor, From Sand-core to Automation (Glass Manufacturers' Federation, England)

### General Notes

Free-blown bottles were first produced about 2,000 years ago. At first they were 'free-blown' but were later mouth-blown in moulds. In 1903 the first successful machinery for blowing bottles was manufactured. Free-blown bottles are still used for special uses or for aesthetic purposes.

After about 1917 machinery became almost universal in bottle manufacture.

Free-blown bottles were most common until the mid 1850's. Moulded bottles were reintroduced about 1800. (There were some moulded bottles quite early but moulding was not used much between then and 1800).

### Ingredients

Sand - ideally 99.9% pure silica.

Flux - to enable melting of the sand at a lower temperature (about 2000°F).
Two fluxes are used principally:
- potash - which causes the glass to be more difficult to blow,
- soda - which produces a softer glass.

Lime - to stabilize the glass. A sand/soda glass is unstable and tends to dissolve. ("Soda-lime" glass now forms about 90% of total production).

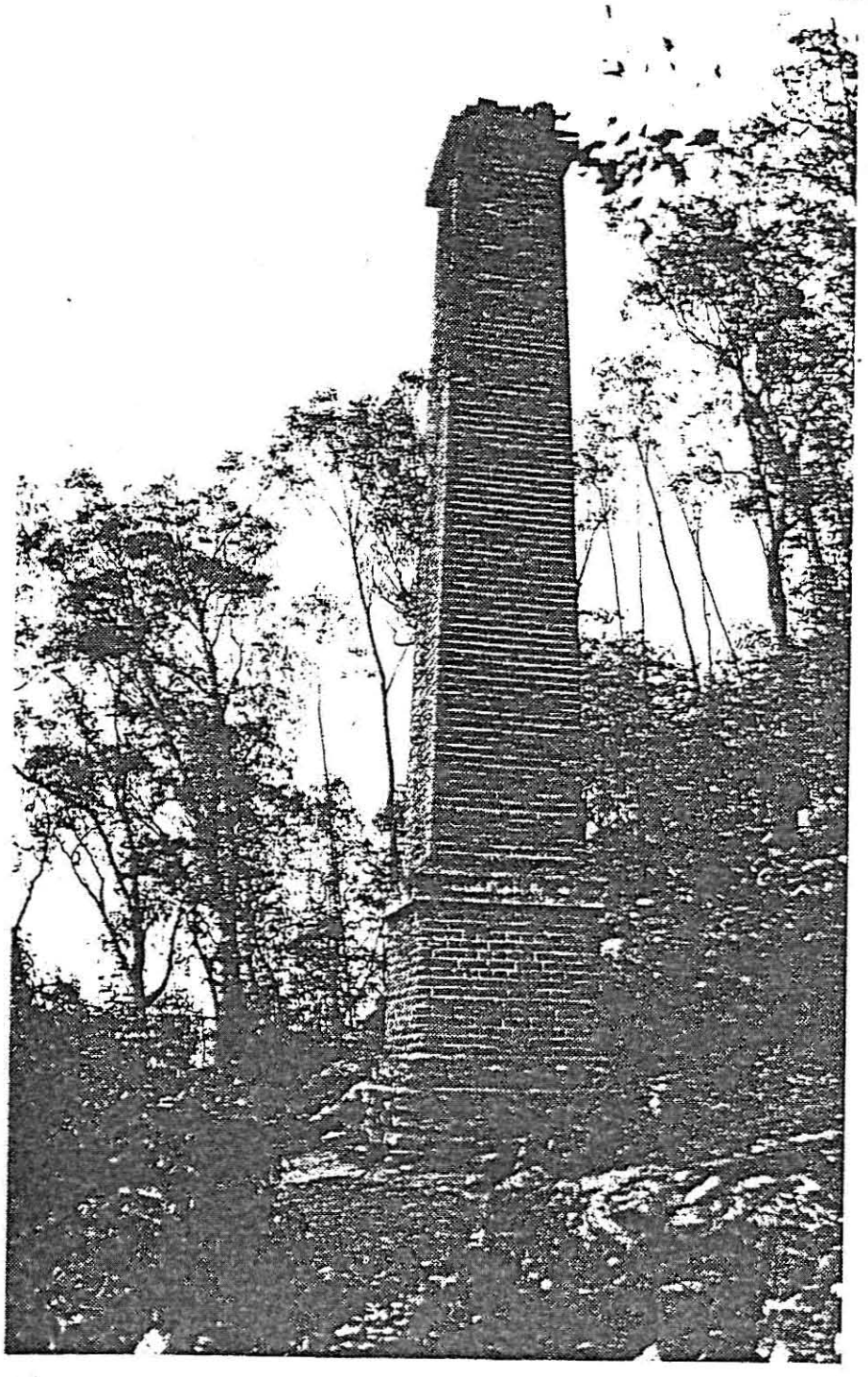
Cullet - about one - to three-quarters of a mix would be old glass.

Crystal glass - made of refined ingredients with about 25% to 50% lead oxide.

of two of the pictures in Harper.

The right to dredge was taken up in 1899 but the dredging was not in full swing until 1901. Two Davis and Kirshaw suction dredges were installed. In 1908 further down the creek another company took up bucket dredging and for a time there were five others below Grahamstown.

S.J.



ADELONG FALLS.
The remaining brick chimney.

## Colouring

Colour depends upon the amount of metallic oxide present, the temperature of the melt and upon reheating at certain stages of manufacture. Glass tends to be green to blue because of iron impurities. Colourless glass is bleached by adding manganese or selenium. Too much oxide gives a 'black' glass. A cheap 'black' glass was made by adding iron filings.
[See 'colour change' in the following key.]

| Colour | Oxide of the following metal used |
|---|---|
| . Blue | cobalt or copper |
| . Yellow | chromium, sulphur, silver, charred horn |
| . Purple or brown | nickel |
| . 'opal' ('milk') | tin, zinc |
| . Ruby red | gold (metal) |
| . Red | copper |
| . Emerald | copper or iron filings |
| . Purple (or colourless) | manganese |
| . Yellow, pink (or colourless) | selenium |
| . Common brown | carbon |
| . 'Prismatic surface' | reheating when copper present |
| . Surface colour similar to oil slick on water | probably due to thin film of glass on surface being dissolved on exposure. |

## THE KEY

PRINCIPAL HEADINGS:

| | | |
|---|---|---|
| (A) Surface | (B) Shape | (C) Seams |
| (D) Lip and Stopper | (E) 'Kick up' | (F) Lettering |
| (G) Pontil marks | (H) Colour changes | (I) Seals |
| (J) Vent marks | (K) Some defects | (L) Fruit jars. |

(A) Surface

A.1 - a very smooth surface without seams.

A.1.1 Free-blown bottle: no seams, lack of exact symmetry, high lustre surface
- most common until c.1850's.

A.1.2 Turn-moulded: (bottle turned in mould to obliterate seams). no seams, smooth surface, but more precise symmetry. May be rings due to impurities or imperfections of mould during turning. These can be seen by looking along surface of the bottle.
- mainly just before or just after 1900.

A.2 - Seams present:

a moulded bottle
- after c.1800 (see C)

A.3 - Whittle marks:

('hammered appearance' of surface produced when iron mould is cold. Tended to occur in first

A.3 bottles produced in a day. In later years all iron moulds were pre-heated)
- iron mould, after c.1860.

(some bottles are given artificial whittle marks, but experience may help to detect this)

N.B. Condition of surface is not a reliable indicator of age, although it helps. A bottle in dry conditions, if sheltered from sand-blast, will keep a shiny surface far longer than one in moist conditions. Experienced observers may use surface erosion as another indicator of age.

(B) Shape

(principally refers to general evolution of shape of cylindrical bottle, with two special shapes)

B.1 Evolution of cylindrical bottle:

B.1.1 longer neck
- before about 1675.

B.1.2 neck shortened, shoulder more angular
- c.1675/1680.

B.1.3 neck shortened further, body more dome-shaped, 'kick up' wider and higher. Body rather tapered.
- c.1680-1715.

B.1.4 cylindrical bottle similar to modern port bottle - body sides nearly vertical
- c.1750.

B.2 Free moulded bottles in general:

A blown bottle tends to be spherical unless moulded. Flat bottoms and sides may be formed by placing on 'marver' (flat plate) or by shaping with paddle-like tools, or by slapping down on marver.
- most common before c.1800.

B.3 Special wine bottles:

B.3.1 slender green moselle

B.3.2 slender amber hock

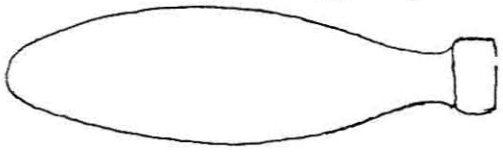
B.3.3 pot-bellied burgundy

B.3.4 'robust' champagne

- c.1800 (U.K.) a bit earlier on Continent'

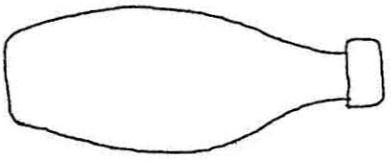
B.4 Egg-shaped aerated water bottles:
(early aerated water bottles were corked and the bottle had to lie on side to keep cork moist and prevent loss of gas, hence rounded bottom)

B.4.1 Original egg-shape



- later 19th C. to c.1907.

B.4.2 Flat bottom egg-shape.
(with introduction of crown-seal bottle could stand up, partly egg-shape preserved for tradition)



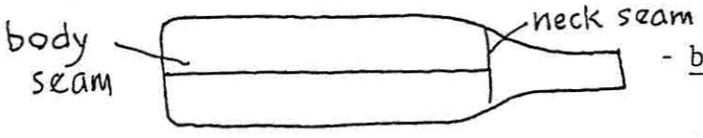
- c.1907 to c.1919.

(C) Seams

General: Moulds became common after c.1800. Mainly wooden moulds were used until c.1860. Principally iron moulds after c.1880. Experience may help to detect surface differences and general appearance of seams. Seams of iron moulded bottles tend to be finer than for wooden and become finer still as better iron moulds are produced.

C.1 Seam on body, not on neck:

C.1.1 2 piece mould for body and shoulders, neck and lip drawn out and formed by hand.




- before c.1860.

C.1.2 later bottles have higher neck-seams.

- after c.1860.

C.1.3 neck seam only about 3mm below crest.

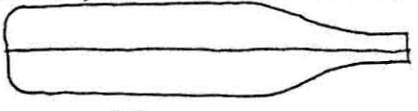
- c.1900.

C.2 No seam on body, neck formed separately.
(some bottles were formed with a one piece mould for the body, with neck moulded separately)

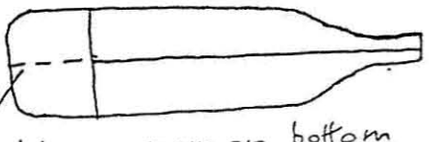

- early 19th C.

C.3 Seam continuous to crest of lip:

2 piece mould, machine made bottle - 1903 or later.



C.4 Three piece mould:



- mid 1800's.

Sometimes seam on bottom part (4-piece mould).

(D) Lip ("Finish") & Stopper

The lip was formed last with a mouth-blown bottle, hence the term "finish" - which is still used although the lip is formed first on a modern bottle. From c.1600 to c.1870 bottles were mostly corked.

D.1 Sheared or rolled lip:
(Lip cut off with shears and smoothed by tool or melting, or lip rolled back causing bulge on inside or outside)

- before c.1840.

D.2 Laid-on ring:
(introduced for effervescent liquids to enable wiring on of cork)

thread of glass laid on a round neck about 6mm from crest
- after 1840.

Note: In c.1850 a 'lipping tool' was introduced to form the lip. This may leave scratches and/or rings circumscribing the neck near the lip.

D.3 Codd's glass marble stopper:

- 1873 and later.

D.4 Rubber gasket inside bottle controlled by wire loop through neck: (Hutchinson's patent)

- c.1873 and later.

D.5 'Lightning' stopper:

rubber or porcelain plug clamped down or released with click of wire bale

- mid 1880's to c.1920.

D.6 Crown seal:

- 1892 and since

(-not general in Australian manufacture until c.1907)

D.7 Inside screw closure:
(especially whiskey bottles and English pottery bottles)

- c.1900.

D.8 Outside screw closure:
(used earlier on 'specialty bottles' such as reusable whiskey flasks but not common until thread standardised in 1920)

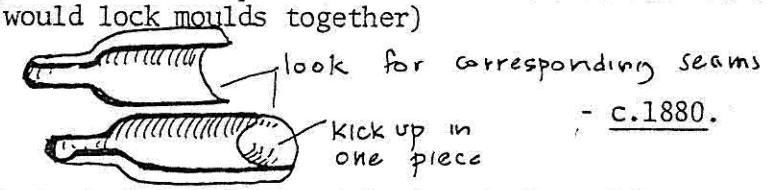
- c.1920 and since.

(E) 'Kick Up' (Concave base)

E.1 Very exaggerated:

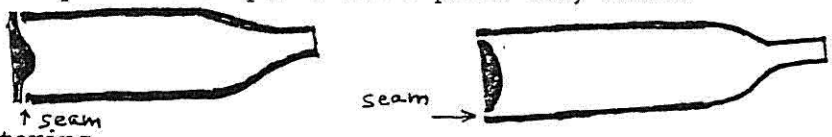
- 18th C. & early 19th C.

E.2 Moulded kick-up:
(Conventional 2 piece mould could not be used as kick-up would lock moulds together)




- c.1880.

E.3 Separate base-plate and 2 piece body mould:




(F) Lettering

F.1 Principally introduced after 1860 with iron moulds, but could occur on bottles before this. Does it appear moulded, if so

- after c.1860 (roughly)

F.2 Slug plates:

introduced in late 19th C. These were thin metal sheets with embossed lettering which fitted into a sunken panel in the mould. Plates could be changed to use the same mould for different customers' bottles. (A seam might show around edge of panel).

- late 19th C.

F.3 Lettering on bases:

F.3.1 1 or 2 digit number. Cavity number. A sequence of moulds of same design.

F.3.2 3, 4 or 5 digit number, with perhaps 1 or 2 letters. Mould design number.

F.3.3 Symbol, monogram, few letters. Trademark.

F.3.4 Word. Name of product or customer.

(G) Pontil Marks (or Scars)

(these appear on the centre of the base of the bottle)

G.1 Pontil mark:

rough ring or disc. Made when bottle held by 'pontil' during forming of lip. All bottles before 1860 with few exceptions. Most of exceptions would have a cold finished lip in which case grinding should be obvious.

- generally before 1860

G.2 Improved pontil mark:

round or squarish. May appear to be ground in. Partly or wholly metallic surface.

- after 1840

G.3 No pontil mark:

if a mouth-blown bottle

- c.1860 to c.1903

(H) Colour Change

H.1 Manganese used to produce clear glass. Very apt to 'solarize' to amethyst colour.

- c.1890-c.1916

H.2 Selenium became most popular 'discolourizer'. May also change to a 'ripened wheat' or 'honey' colour.

- after c.1916

NOTE: Clear glass containing Manganese may be coloured more quickly by exposure to more intense ultraviolet radiation. Glass may also be dyed. If dyed scratching will show that colour is only near surface.

(I) Seals

commonly on shoulder, often with lettering or mark.

- introduced c.1650

(J) Vent Marks

As iron moulds improved the complete neck and lip were formed with the body mould. Moulds were also locked together more securely. Air could not escape from between glass and mould so small vent holes were drilled - usually in shoulders or base. They left a pinhead size pointed mound of glass, usually placed where they might appear decorative. E.g. - quite common on whiskey bottles at shoulders in c.1900. Now often incorporated in raised lettering or drilled within joints and not noticeable.

If vent marks are detectable - probably later 19th C. to early 20th C.

(K) Defects

(just a few more obvious ones. These are not much use in identification).

. Stones: fragments broken off when poor clay used in melting pots. Wrinkles in glass may cause 'tails' or 'insects'.
. Seeds: myriad small bubbles formed if mix fired too slowly.
. Cloudy or bubbly glass: usually cheap bottles due to 'gall' not being removed from surface of melt.

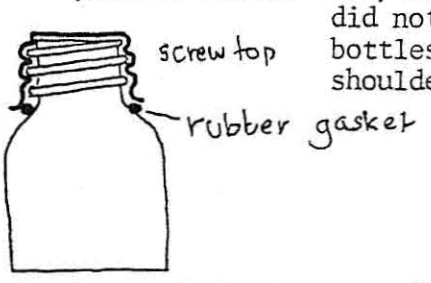
(L) Fruit Jars

L.1 Wide mouth bottles:

- before c.1850

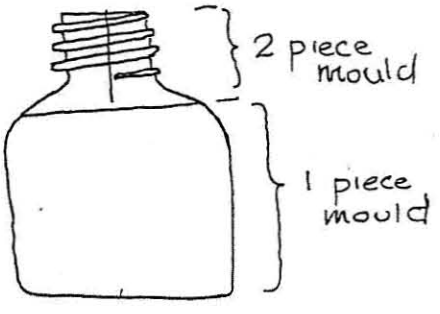
L.2 Mason screw topped fruit jar:

(John L. Mason. Body mould included threaded mouth - which did not appear until later on necked bottles. Rubber gasket for sealing at shoulder).




- c.1858 and since

L.3 Jars made by 'press and blow' machine




- c.1882 and since

D.H.

## VI. THE PRESENTATION OF TECHNOLOGICAL CHANGE

(Address to the Museums Association of Australia, Sydney Annual Conference 1980 : - Reprinted by kind permission.)

When asked to talk to you today on technology and technological change my immediate reaction was one of surprised pleasure - and indeed how could one feel otherwise when presented with the opportunity of addressing such a respected and influential body as the Museums Association of Australia? It was only when I began seriously to think about what I should say that misgivings at the rashness of accepting the invitation began to creep in. I am neither a museumologist nor a curator; I am a member of no museum board and my personal collections have hardly gone beyond cigarette cards, stamps and antique maps. On the other hand, I have practised engineering for many years at a number of levels - literally as a mining engineer as well as in academia - and I am intensely interested in technological education. So here is a link, and it is as a technologist and educationalist that I would like to address you today.

Before discussing the presentation of technology or technological change we must first establish what it is - and what it is not. In a phrase full of Victorian grandeur the Oxford Dictionary defines technology as the 'science of industrial arts'. This definition worries me as a practitioner because it rationalises in hindsight what is very often a tortuous series of unscientific hunches and lurches aimed at making or doing something better than before. It is seldom the inevitable result of a series of coolly - preplanned developmental steps which some writers would have us believe. By no stretch of the imagination can one look on it simply as the application of science to practical problems. In only a few cases - and electronics and chemicals are possibly two of them - is such a concept even remotely true. The recent Myers report on 'Technological Change in Australia' summarises the position very well by saying that 'technology is generally taken to refer to practical knowledge and especially to knowledge of how tasks are done and how things are made'. In other words, although it can be pedestrian and down-to-earth, it is of crucial importance to everyone of us. It is not primarily concerned with establishing principles or synthesising causal relationships or gaining knowledge for knowledge's sake. Human reactions, prejudices, mistakes and preferences intrude at every stage. Technology is as old as man himself; it is not a product of industrialisation nor is science a prerequisite for practising it. The ancient Egyptians and the pre-colonial Aborigines both had their technologists. Technology is the manifestation of man's endeavour to ease the physical conditions of existence by the ingenious use of his environment, and the result is very much the child of the practitioner. To take a single example, America, Sweden, Japan and France build motor cars with quite different characteristics even though they all seek to solve the same problem of providing personal transport. In other words, technology is a product of a particular community and environment. In contrast to the sciences where it is often advantageous to think in terms of a dehumanised set of principles, technology can only be understood in the context of the people who develop it and the way in which it is used or operated. The long-term social, economic and environmental implications of technology are seldom in the mind of its practitioners, partly because there is seldom a satisfactory way of establishing those complex parameters, and partly because the immediate practical problems usually demand complete attention.

Immediately one understands the nature of technology, the difficulty of presenting it to the public becomes obvious. It is meaningless in my view to exhibit technology as a collection of complicated static machines, because their function is generally incomprehensible when not operating and their significance can only be appreciated in relation to the designer's intentions or the skills of the operators using them. In other words, the machine is the tip of an iceberg of man/machine interactions; to concentrate on it alone and forget the rest is to catch the form but lose the substance. Some museums have tried to circumvent the difficulty by grouping dummy figures around machines to give a semblance of realism but the absence of, for example, noise, smell, motion and 'atmosphere' lead to quite inadequate and sometimes a positively misleading presentation. Anyone who has witnessed or taken part in the starting up and running of a large beam engine (as is possible at the Steam Museum at Kew in London) comes away with a far better appreciation of steam technology than by staring at the intricacies of the stationary machines in the Science Museum at South Kensington. To take another example;

exquisite models of early marine engines can be seen in most technological museums; many will run with silky perfection by pressing a button on the cabinet. This gives no inkling of the skill, arduousness and danger involved in running these juggernauts, in the extreme conditions of heat, humidity and darkness which prevailed in the bowels of the early steamships. It was not, of course, that the designer wished to expose human beings to such trying conditions, it was simply that his technology was insufficient for him to do any better. It is this interplay between man and machine which is a fundamental element of technology and which is ignored in most science museums. I am not decrying the presentation of carefully restored pieces of machinery or elegant models as such; of course they have their place but they are quite unable on their own to represent technology or technological change.

The second point I would like to make is that the resource and inventiveness of man seems almost limitless so that we should not attempt to preserve the physical manifestations of technology before recognizing that we are working with an open-ended system. While natural science collections are circumscribed by the capacity of the earth to evolve different life species within the human time span, and pure science demonstrations strive towards unification and synthesis of a limited number of principles, there is no end to the growth of technology. Already most museums have warehouses stuffed with derelict machines awaiting restoration. Although some of them may have a certain rarity value (and this is generally very difficult to ascertain with any degree of certainty) most are mass-produced and duplicated in Australia and around the world. This flood of physical artefacts will not dwindle with time - it will simply grow and grow, and so will the museum directors' cry for more resources for the impossible task of attempting to encompass it. Bigger warehouses and larger museums are not the answer because, as I have already pointed out, technology is much more than a collection of artefacts. A very high degree of selectivity must therefore be at the core of any technological collecting policy. I suggest that collections in Australia should be concentrating on Australian technology, and particularly on the technology of the area in which the museum is situated. The problems of conserving physical manifestations of overseas technology should be the prime responsibility of the originating country concerned. Already many European and American countries have accepted this task and have made big strides in that direction. In Australia such a recognition has yet to develop but if we do not accept this responsibility, no other country will (or can) do the work for us. A beginning has been made in the agricultural machinery area where the Ridley Stripper and jump-stump plough are well-known examples of innovative local technology. But where else?...we should seek out examples and display them proudly.

It is probably true to say that Australia does not rank very high in the league of innovative technological design. The tendency has always been to buy in machinery or drawings from overseas and then alter them to suit local needs. We are great adapters and modifiers of existing equipment because of our environment and experience - and this could be brought out in any exhibition of technological change, together with a careful look at the local human input which initiated and carried it through. The small museum equally with the large has a part to play in this work. Technology and technological change pervades all society in all parts of the country, and big is not necessarily beautiful. Excellent examples can probably be found locally. The physical preservation of some technological items such as locomotives and traction engines is such a popular recreational activity in its own right that the intervention of professional museums is probably unnecessary. However, some registration system and advisory service is urgently required in order to encourage high quality conservation procedures. Only in the case of extreme rarity - especially in relation to the locally-designed or built equipment - need the professional museum take command.

Before exhibiting technological artefacts the museum director should have very clearly in his mind wherein lies the significance which he wishes to preserve. Is it, for example, in the basic design, the manufacturing technique, the quality of the finish or the skills required by the operator? Each calls for a different type of conservation and for a different kind of presentation in relation to the human activities associated with the artefact. The dreariness of many folk - and even some specialised-museums can be attributed to the indiscriminate exhibition of large numbers of mass-produced items which are unrelated to the human aspects

of their design, construction or use.

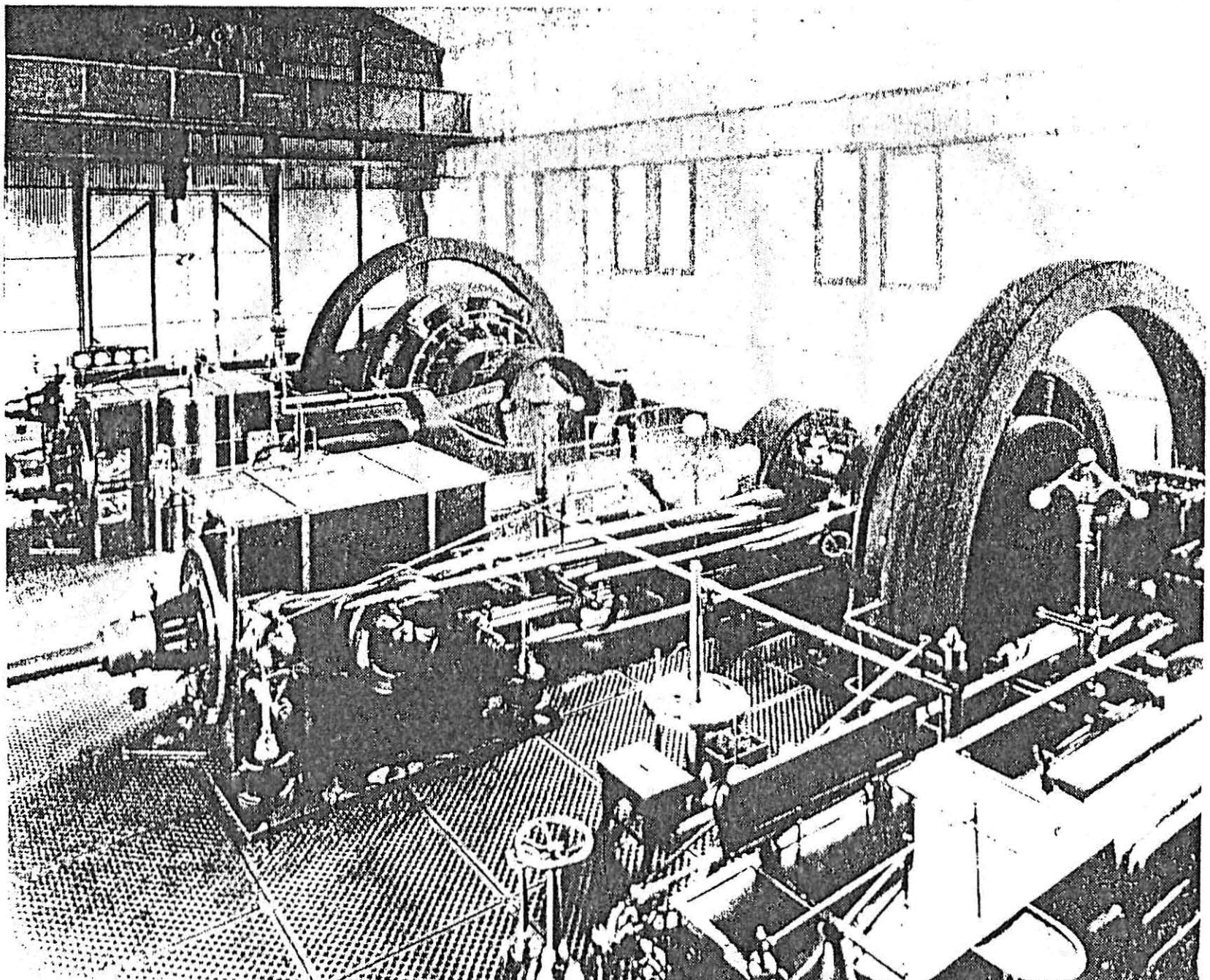
If the constructional skill or finish associated with a specific exhibit is considered to be of paramount importance then there may be no alternative to leaving it untouched at the expense, if necessary, of not operating it. But in other cases the understanding of technology - and technological change - is more likely to be advanced by, for example, building a steam engine from the original plans and operating it rather than by having a rusting, inoperative, incomprehenisble, original on permanent exhibition.

If there are thorny problems in presenting past technology, the difficulties of handling present and future technology are even more daunting. To take an example from a single area of activity - mining - the sheer scale of the technology makes physical preservation virtually impossible. 200 tonne dumper trucks and 250,000 tonnes per day bucket wheel excavators just cannot be preserved and operated in a meaningful way. And bearing in mind that the designs are generally fully-imported what should our responsibility be? What should present-day society be doing to ease the headaches of the museum director of tomorrow?

Well, technology has provided us with a wide battery of techniques for conservation other than simply physical preservation. We should be learning how to improve and apply them to heritage work - the development of models in parallel with full-scale operations, three dimensional holographic photography, time-lapse photography, simulation by models, digital data assimilation and retrieval. Here are the keys to preservation; if we can train jumbo pilots without them ever leaving the ground we can surely bring to the population a graphic appreciation of what coal mining is like at 1,000 metres below the surface or how a gas turbine works. Maybe the planetarium of today will be supplemented by the technicarium of tomorrow in which a small collection of models and parts of major pieces of equipment will supplement comprehensive audio/visual/tactile facilities. Exactly what the role of museums should be in such developments is a puzzling and interesting one and I think that technological museum directors have some tough decisions to make in the future regarding the role of their institutions. There are already signs overseas that museums are reviewing their role in society and it is good to see similar moves starting in this country.

Every community must generate its own technology but we are afraid of ours because many of us do not understand it. The first step must therefore be to improve that understanding and impart a recognition of how technology functions and why it cannot - by its very nature - solve all our problems. This challenge calls for new thinking but it also provides great opportunities for museums which are prepared to review their function in society. I believe that the next two decades can be very exciting ones for museums in Australia and you have my very best wishes as you move forward into this new phase of development.

R.W.



ULTIMO POWER HOUSE

The Engine Room, c. 1899.

## VII. THE POWER HOUSE AS AN INDUSTRIAL ARCHAEOLOGICAL SITE OPPORTUNITIES FOR PRESERVATION AND DISPLAY

The idea of re-cycling old buildings as museums is a commonplace. Quite literally, there are weekly, if not daily calls for some old building lying derelict to be turned into a museum. In Newcastle for instance, there are half a dozen buildings which are being proposed as museums, and at least two - one in Randwick and one in Bronte - within a couple of kilometres of my home.

The former Ultimo Power House has been allocated to this museum for its new home. It is a particularly appropriate home, because of its industrial and transport associations, for a technological museum. It is also architecturally suitable of course, in terms of scale, and in terms of location.

However, unlike many buildings which have been suggested as museums, it is not on the National Trust or Heritage Commission listings. So in theory, we can do what we like with it. Yet, because of its history as well as form, both the architect and the museum independently concluded that something had to be done with it.

The result is the museum's embryonic project to record the Ultimo Power House as an historic site - an industrial and archaeological site. While committed to adaptive re-use of the Power House as a museum, we recognise that some features of its former status can readily be retained in the new museum. Indeed, the building will be part of the display. What we cannot retain will be recorded as best we are able to do, given limited human resources. The pressure to develop the new museum is substantial, but we regard this project as a necessary part of that development.

The Ultimo Power House was built to provide the power for the electrification of Sydney's tramway system, which had begun in 1879 using American steam motors. The building is now derelict, a vast loft for the pigeons whose droppings provide the only archaeological "deposits". (Incidentally, our opportunities for underwater archaeology were dashed when the water was pumped out of the basement).

Our aim will be to record the features of the building and carry out the research necessary for an understanding of its history and function. We are collecting information rather than artifacts.

Our first step will be a survey of the archival material - reports, photographs, plans and so on.

The Wunderlich Project - a scheme to record the history of the now-demolished Wunderlich Factory in Redfern - was our first foray into the proper recording of industrial history, an area where the museum recognises that it has clear responsibilites.

This new research will be aimed not only at a written history of the Power House, but in addition it will attempt to explain the actual remains of its operation. To illustrate what I mean, there was a switchboard in the Power House, where there was a fire in 1901. A search of the literature will tell us what type it was and when it was installed and modified; but we also need to know where it was, and if any traces are still there. In this case, parts of it still can be seen, against the north-west wall of the original engine room.

The history of the Power House is quite complicated, for there are several building periods and many changes and additions to the equipment.

The earliest structures were built in 1899 on the northern end of the site, facing William Henry Street and the "Iron Bridge". They included an accommodation block with the entrance surmounted by an inscription, "N.S.W.G.T. Power House 1899", surrounded by a stylised representation of electricity as Flash Gordonesque lightning bolts. This is one of the few examples of architectural nicety in the building and will of course be preserved in situ, although not as an entrance.

Behind the accommodation block was the original engine room fitted with American Reynold-Corliss horizontal steam engines direct coupled to General Electric 850 kilowatt generators.

To the east was the original boiler hall, where the water pumping equipment was also located. The smoke-stack which served these boilers went out of use around 1930. It was mostly demolished in 1968 to make way for the four-lane William Henry Street Bridge, which replaced the two-lane Iron Bridge of 1886. The foundations of the smokestack will be consolidated and retained. Part of the 1899 Boiler Hall, replaced in 1902, can still be seen adjacent to it.

The main buildings we see today were completed in 1902. On the north-east (right) is the new boiler hall with its two new chimneys, and on the south-west (left) is the new engine room. The chimneys were demolished to roof level not so long ago. They will not be removed, but the architect will keep them and use them as intakes for the air-conditioning plant to be located in the basement.

A photograph of the interior of the boiler hall shows how complicated it was. All the boilers, steam and water pipes have since been removed for scrap, leaving only the steel supports for the coal hoppers above. These cannot be retained in the museum, but will be recorded before they are removed. How this will be done, twenty metres above the floor, has yet to be worked out.

The interior of the engine room, shown in a view taken between 1902 and 1912, is likewise devoid of its machinery. Originally it had American Allis-Reynolds vertical cross-compound reciprocating steam engines coupled to 1500 kilowatt General Electric alternators. These were installed in 1902 when the DC power generation was supplemented by AC. We need to know how the hall was fitted out at various periods and to relate this to the concrete piers and so on which remain. At least one of the three travelling overhead cranes in this hall will be retained, as might some of the decorative metal railings still preserved in the north-west corner. These probably date from 1899, for they are in the original engine room where the roof level is lower than in the 1902 addition. The roof line, levels and trusses throughout will be retained by the architect, preserving the exact scale of the interior.

To the south-east are the two major later additions. The switch house was erected between 1922 and 1926, and contained floors of transformer banks, high tension switchgear and a control room from which to observe the whole operation of the engine room.

The last major addition was the concrete-walled coal bunker, constructed after 1930 to hold a stockpile of 10,000 tons of coal for the boilers. At the same time the sixty small boilers in use were replaced with six large ones and two 20,000 kilowatt turbo-alternators replaced some of the smaller generating equipment.

Outdated, with trams going out of service, and electricity coming increasingly from more efficient power stations outside the metropolitan area, the Ultimo Power House was phased out slowly between 1958 and 1963. No longer would residents complain about the smoke which had belched from its chimneys for sixty years.

This summary history of the Power House is an indication of what we shall put into more detail when we have been through the available sources. These include archives of the Urban Transit Authority and the Public Works Department, photographs held by the Government Printer and former Government Railways, and published sources.

We then have the task of correlating this to the remains by using our eyes. This is a dangerous business. The many holes in the floors demand that you move about with eyes very firmly on the ground. Insurance and safety will certainly be a priority item in the recording programme. We shall need to keep our records up to date in case we lose someone unexpectedly.

Expert advice will be essential to this recording, for the trained engineer or architect will notice things which are meaningless to the uninitiated. For this reason we shall be asking the Institution of Engineers, through its Heritage Committee, for help. Other bodies we hope to consult are the Historic Buildings Section of the Public Works Department, the Rail Transport Museum, the Sydney

Tramway Museum, the N.S.W. Institute of Technology, and the Heritage Council. The Police Photogrammetric Team can also expect a call.

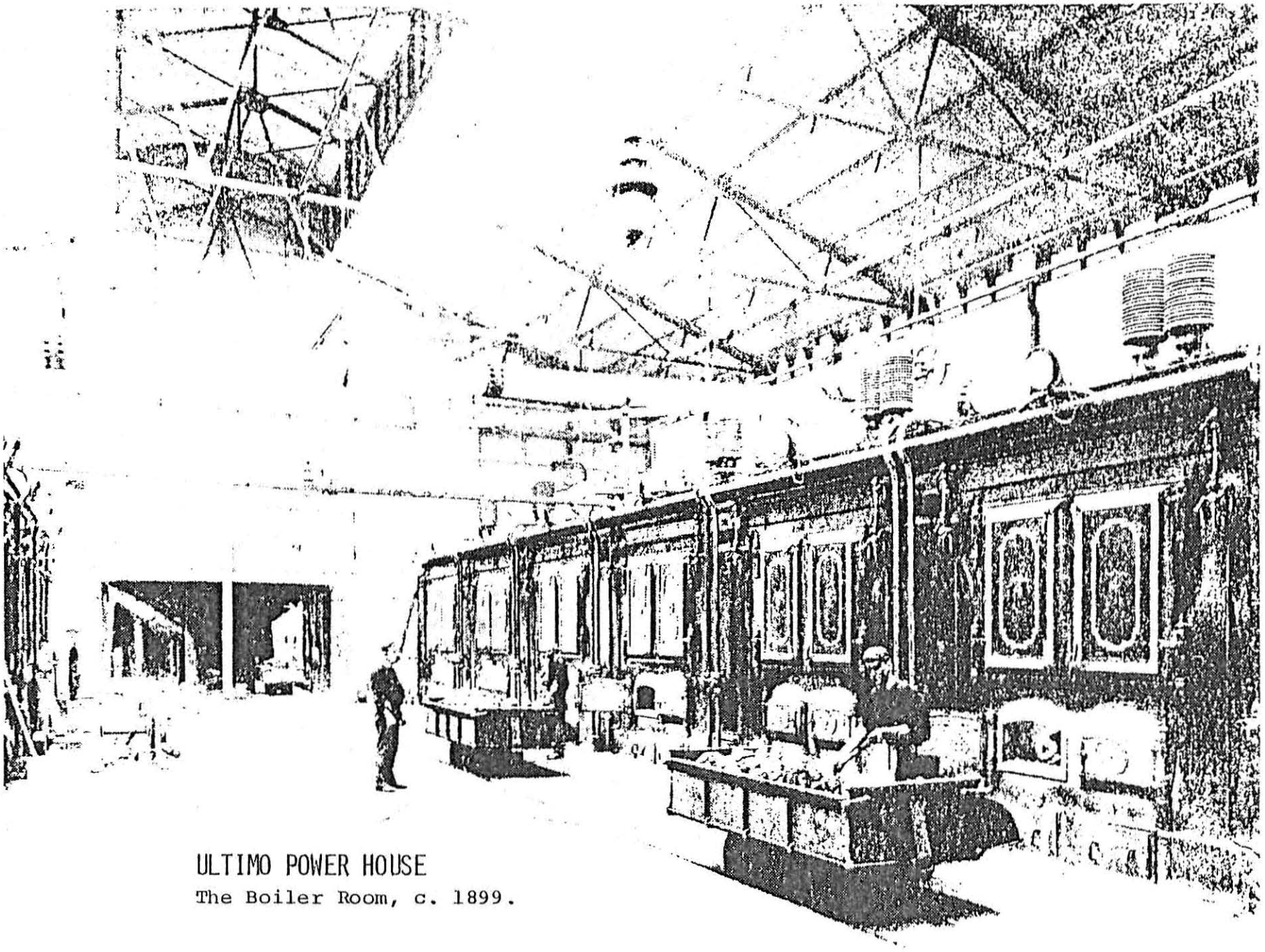
An avenue of research which we used to good effect with the Wunderlich Project was oral history. Former employees of Wunderlich were very happy to help us gather material, and not only provided additional factual information, but managed very clearly to give an impression which does not come through in any other way. Former Power House workers will be able to give us that vital human element which turns a dead building into living history.

The result of all this will be a permanent record of the original use of our building. From the material collected, we will prepare publications on the history of the Power House. This information would be distilled for popular consumption; the archival material would be available for scholarly scrutiny.

The research will also be the basis for displays. The consultant designers can fit the information into displays on tramcars, electricity generation, or steam technology - and flesh out the displays with the stories of the people who worked with these machines. The visitor should gain an added dimension from being in the very place where this operation took place. With the benefit of a full history of the building, we can show not only the technology but also the technological and human failures. The fire of 1901, I mentioned before, strikes, working conditions, and personalities associated with the building could all be investigated through the display medium.

We have been fortunate to have an architect who respects the fabric and history of the building. In his work, which leaves many parts of the building almost untouched, will be the clearest display of its past. It is our intention that when it is turned into a museum, you will still be able to go on a walking tour of its history.

J.W.



ULTIMO POWER HOUSE

The Boiler Room, c. 1899.

## VIII. RESEARCH PROJECTS IN HISTORICAL ARCHAEOLOGY CARRIED OUT BY THE STUDENTS OF HISTORICAL ARCHAEOLOGY II & III, 1980

To be housed with the Archivist, Fisher Library and to be made available to authorised persons wishing to carry out additional research in these areas.

Thornleigh Brickworks

Bellevue

The State School System in Tasmania with the help of eleven of the plans of such schools by Henry Hunter

T. Grounds & Sons (Architectural Modellers) Newtown

Sydney Foundry and Engineering Works

Birdsall Bros. Tannery

Old Children's Hospital, Glebe Point Road, GLEBE

Pymble Quarry

Mrs. Macquarie's Point Battery

Bunces Tannery

Manly Wharf - Its History and Development 1856-1974

Early Sydney Garages and Service Stations

Steam Power in Primary Industry

Randwick Workshops

Mill Merran and Environs 1840-1929

Land use of Turramurra

Pyrmont Research Project - The Commonwealth Wool and Produce No. 1 Store, Wattle Street, Pyrmont

Rix Creek

A Plan of Action for the Cemeteries of the MacDonald River Valley, N.S.W.

Royal Edward Victualling Yards

Sydney Mint Building

Holy Trinity, Erskineville

Parramatta

Fairyland Pleasure Grounds

Bradford-Kendall Foundry

Battery at Inner South Head 1840-1900

The Rape of Castlereagh

History of Darling Mills

Sydney and Suburbs Hydraulic
Power Co. Ltd.

Rotundas - Sydney

Botany Waterworks

Parramatta

The Customs Station at Broken Bay
1843-1980

Stanwell Park Viaduct

Sydney Rotundas

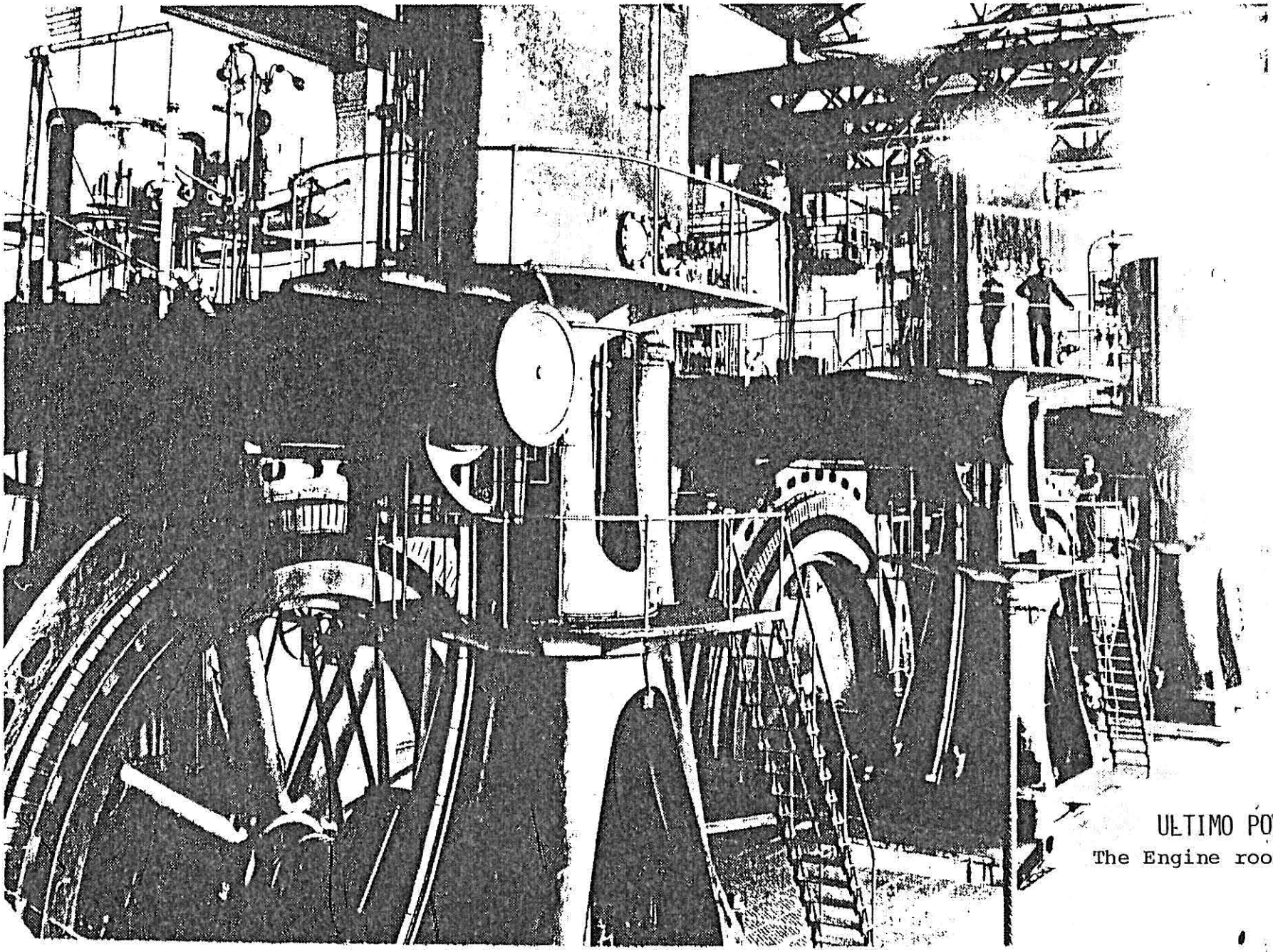
Goulburn Railway Station

Georges Head Military Fortifications

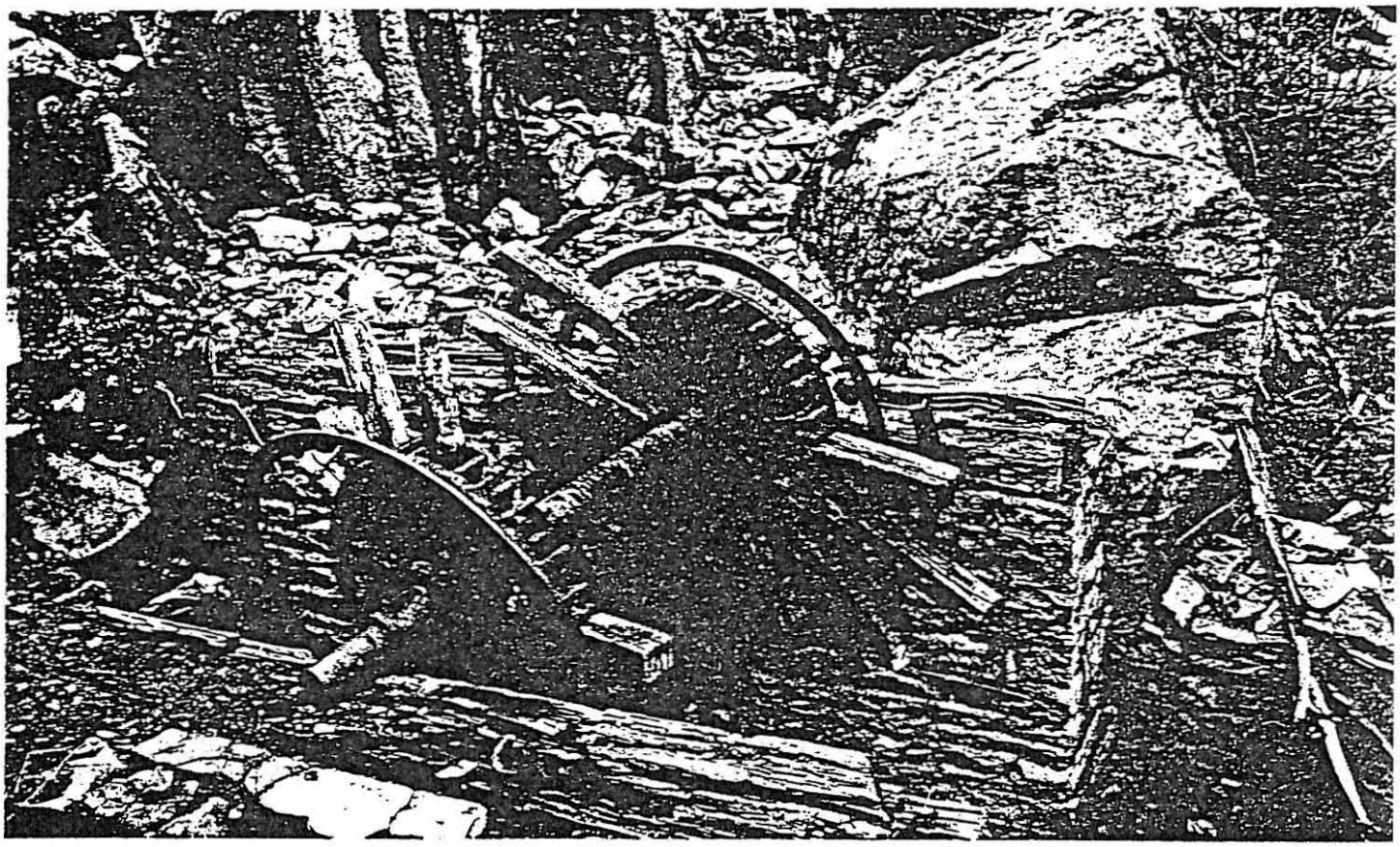
Report on Sunny Corner Silver Mine

Webster & Lumsden Pty. Ltd.

Gold Mining on Glen Elgin



ULTIMO POWER HOUSE
The Engine room, c.1902-1912.



ADELONG FALLS

Remains of a water-wheel, probably from the Wilson & Ritchie "Reefer" battery.

AUSTRALIAN SOCIETY FOR HISTORICAL ARCHAEOLOGY

Cut off order form

To be addressed to:

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AUSTRALIAN SOCIETY FOR HISTORICAL ARCHAEOLOGY

NEWSLETTER Vol. 11 No. 2 June, 1981

This new, shorter Newsletter is part of a programme to upgrade A.S.H.A.'s publications which, it is hoped, will provide both a regular news service to A.S.H.A. subscribers and also an annual publication for more substantial contributions to historical archaeology. In line with this re-organisation, the Newsletter will contain only short items covering the following topics:-

- current and forthcoming events
- current research projects, excavations, etc.
- short accounts of research recently completed, including consultants' reports, together with details of where this material may be consulted
- research queries
- details of new publications

together with other short items of interest, such as information concerning applications for National Estate grants etc.

Contributions are requested for future issues of the Newsletter, which will appear quarterly. News items are requested from all States, to enable the Newsletter to reflect activities in historical archaeology throughout Australia. The deadlines for the four issues per year will be as follows:-

1st March, 1st June, 1st September and 1st November.

## General News

- Dr. Angus Buchanan of the School of Humanities and Social Sciences, University of Bath, England, and Mrs. Buchanan made a tour of all States in May. Dr. Buchanan is in charge of the National Record of Industrial Monuments, held at the University of Bath, and is currently researching historic engineers.

- A conference on 'The Protection of the Engineering Heritage' is being organised by the Institution of Engineers, Australia, through the National Panel for Engineering Heritage, to be held in Brisbane from 9-12 May, 1982. A call for papers for this conference has been issued.

All correspondence relating to the conference and proposals for papers should be addressed to:

The Conference Manager,
The Protection of the Engineering Heritage,
11 National Circuit,
BARTON. A.C.T. 2600.
Telephone (062) 73 3633

The final programme for the Conference will be available in February 1982.

- 'The Australian ICOMOS charter for the conservation of places of cultural significance' (The Burra Charter) is available through A.S.H.A. at a cost of 30 cents plus postage.

- Mr. Noel Thorpe, Honorary Archivist of the Metropolitan Water Sewerage and Drainage Board will give a lecture entitled 'Idiosyncracies of the N.S.W. Government Tramways' on Monday 10th August, 1981 at 6pm (refreshments 5.30pm) at the Institution of Engineers Auditorium, Eagle House, Alfred St. and Lavender St., Milsons Point. The lecture has been arranged by the Sydney Division, Engineering Heritage Committee of the Institution of Engineers.

## A.S.H.A. Publications: The Future

In the ten years since the publication of the A.S.H.A. Newsletter Vol. 1 no. 1, the field of historical archaeology has broadened from an initial concern with the preservation and conservation of historic buildings to encompass a wide range of such varied topics as industrial archaeology, pioneer technology, the rural landscape, penal and military history and its associated architecture, and many others.

- The development of interest in these fields has been accompanied by a corresponding growth in research, survey work and excavation, and it is now vital for the continued progress of the subject that these studies should be accessible in published form. In order to meet this need the Australian Society for Historical Archaeology proposes to establish an annual Journal to contain substantial scholarly contributions in historical archaeology from throughout Australia.

- The A.S.H.A. Newsletter will continue to be published and will appear quarterly containing short accounts of current projects and events.

- The Occasional Papers series will be continued for larger scale publications such as final excavation reports which may require extensive illustrative material and which may be too long for inclusion in the annual journal.

- A Manual of Historical Archaeology in Australia describing the methods and techniques of historical archaeology for students is also being prepared.

It is hoped to produce the first annual publication in 1981 and contributions are now sought for this, and for subsequent volumes.

The annual A.S.H.A. subscription will in future entitle members to both the Newsletter and the Journal. As in the past, the Occasional Papers will be separately priced, depending upon size and will be available through the Society. A separate subscription rate will be established for those only wishing to receive the annual Journal.

It is hoped to publicise the appearance of A.S.H.A.'s new annual publication amongst the members of other societies engaged in archaeological and historical studies and those concerned with the national heritage to encourage contributions from the full range of disciplines which are combined in the study of historical archaeology, and also to enlarge the membership of the Society to help funding.

## 1st annual A.S.H.A. Seminar in Historical Archaeology

The first annual A.S.H.A. Seminar in Historical Archaeology will be held on Thursday and Friday 29th and 30th October 1981 at the National Trust Centre, Observatory Hill, Sydney. It is intended that this will provide a forum for those professionally engaged in historical archaeology. The first days programme will concentrate upon current excavation and research reports while the proceedings on the second day will concentrate upon the problems of historical archaeology for conservation work; in particular, the objectives of historical archaeology for conservation, the role of the consultant in conservation projects and the presentation of reports and management plans.

The number of participants will be limited and preference will be given to professional consultants and historical archaeologists.

Costs and further details will be given in the next Newsletter.

## Regional News

### Queensland

**ANZAAS: May 11th-15th, 1981**

One day of the Section 25A programme at Brisbane this year was allotted to Industrial Archaeology with papers on Lithgow N.S.W. (R. I. Jack), Industrial Archaeology (Angus Buchanan), Electricity in Brisbane (S. Prentice), Totley Silver Mine (Peter Bell), Tivoli Coal Mine (R. Whitmore), Whaling Sites (M. Pearson), followed by a Walk/Drive Tour of Brisbane's industrial sites organised by Prof. Whitmore, Chairman of the Engineering Heritage Committee of the Institution of Engineers (c/- Department of Mining and Metallurgy, University of Queensland, St. Lucia, 4067).

**ICOMOS: May 16th-17th, 1981 (Brisbane)**

Following the ICOMOS General Meeting (Saturday a.m.) held at the Faculty of Architecture, University of Queensland, Richard Allom and Ian Sinnamon organised a coach tour of Brisbane buildings by Queensland architects Dods, Riddel and Stanley. On Sunday, Ray Whitmore introduced the archaeologically-minded to a major series of coke-ovens and coal complexes near Ipswich. Archaeological issues formed a major point of discussion at the ICOMOS meeting especially Article 24 of the Burra Charter. The Article 24 Sub-Committee, with representatives from the Australian Archaeological Association, met and will continue to meet in Sydney to draft explanatory guidelines on this important issue.

**AAA Meeting: May 15th, 1981**

The Australian Archaeological Association also took the opportunity to hold a general meeting at the end of ANZAAS (Section 25A).

### New South Wales

- The 'Conserving Historic Photographs' conference, sponsored by the University of Sydney Historic Photograph Resource Centre, The National Trust of Australia (N.S.W.) and the Australian Society of Historical Archaeology, was held over the weekend of April 11th and 12th and was attended by over 80 delegates from N.S.W., Victoria and Queensland.

The conference covered the many different aspects of historic photography, from the technical processes involved through to their conservation and use in future historical research. Particular emphasis was placed on the use of historic photographs, for historical archaeology and local history; examples of the work conducted by the N.P.W.S. at Hill End and W.E.A. at Lithgow provided a good insight into how we can use photographs to build up a clear picture of life in Australia last century.

The conference was co-sponsored by the Historic Photograph Resource Centre, established to prevent the destruction of this valuable resource material by an unknowing community. Since that time many thousands of interesting and rare photographs have been saved.

The Proceedings of and Resolutions from this conference will be available soon.

For further information about the Historic Photograph Resource Centre contact Warren Wickman at the Macleay Museum, telephone 6923739, or after-hours on 436 2785.

- Rock End Cottage, Bedlam

Robert Varman (c/o Department of Historical Archaeology, University of Sydney) is conducting an archaeological survey of Rock End Cottage, once the home of Banjo Patterson and family for Ryde Council.

- National Parks and Wildlife Service, N.S.W. has received a grant to carry out research into mining at Hill End ($16,000)

- Wells and underground water storages

Hughes-Trueman-Ludlow Pty. Ltd., Consulting Civil, Structural and Environmental Engineers are undertaking a study of the history and construction of (a) wells and (b) underground water storages, in particular those constructed prior to 1900, for the Heritage Council of N.S.W. They would be pleased to be notified of any such structures and in particular any that can be dated with any accuracy. Details are not required at present but they will follow-up personally any advices received. Information on construction methods in use in the 19th century is also sought for this project.

Hughes-Trueman-Ludlow are at 33 Atchison Street, St. Leonards, N.S.W. 2065. Telephone (02) 439 2633.

- Grants available: N.S.W.

Of interest to those associated with non-commercial museums and galleries (included amongst which would be local historical society museums and collections, etc.) is a recent advertisement for applications for the N.S.W. Government's Museums and Galleries Cultural Grants for 1982, administered by the N.S.W. Premier's Department, Division of Cultural Activities.

Guidelines and application forms are available from:-

The Director,
Division of Cultural Activities,
Box 4. 105, Royal Exchange P.O.
SYDNEY. N.S.W. 2000

The closing date for applications is 28th August, 1981.

- Publications

The Department of Home Affairs has published a Directory of National Estate Studies: 1973 - 74 to 1979 - 80 which details projects financed by the National Estate Grants Programme between 1973 and 1980. Copies are available from the Australian Government Publishing Service which has regional sales outlets in each State.

The Open Air Museum: the cultural landscape of New South Wales by D.N.Jeans and P. Spearritt (1980). Published by George Allen and Unwin, with the assistance of the Heritage Council of N.S.W. Recommended retail price $18.95.

'The Open Air Museum is written with a conviction: that the cultural landscape of N.S.W. contains much of historical value that must be preserved! Thus begins an excitingly wide-ranging study of the evolution of the cultural landscape of N.S.W. and of the combined forces of history, geography, economics and politics which have created it. After a general introduction to the subject there are chapters on economic development, rural landscapes, country towns (that most distinctive Australian landscape, different from all other countries) and transport, with more detailed studies of Greater Wollongong, Greater Newcastle and Sydney. The authors present a fascinating survey of the many and varied aspects of the cultural heritage to be seen around us each day and show how these reflect the tastes, values and technologies of different eras. The scope of the book will stimulate research and enthusiasm and does much to promote the cause of historical archaeology and the preservation of that cultural landscape which is the 'Open Air Museum'.