

ARCHAEOLOGY OF THE OLD ICEWORKS, 35 HUNTER STREET, HOBART

by Angela McGowan

(with one table, one text-figure and four plates)

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The invention and development of refrigeration technology in the second half of the 19th century was a crucial factor in the success of Australia's meat export trade, although in Tasmania it was the fruit trade which made the most use of it. The Henry Jones Iceworks and cold-storage facility at 35 Hunter Street, Hobart, was probably established in 1903, involving extensive alterations to the existing building. Six of the seven insulated rooms in the building still contained refrigerant piping in 1986. This represented about one-twentieth of the volume of the original facility and was mostly used for cold storage. However, there is also evidence that most, if not all of the firm's ice-making took place on this site. The "Old Iceworks" was an important component of the industrial and commercial development of Hobart. Its remains were representative of refrigerating technology and equipment found throughout Australia in the early 20th century and were the last surviving ammonia iceworks in Tasmania.

Key Words: ice-making, cold storage, historical archaeology, Hobart, Tasmania.

INTRODUCTION

In July 1986, the Old Iceworks building at 35 Hunter Street, Hobart, was declared unsafe and the Department of Construction Tasmania decided to demolish it, except for its facade. Following this decision, the Tasmanian Museum and Art Gallery was asked to determine the cultural significance of any equipment remaining in the building.

Some investigation of the historical and archaeological significance of the site was made by a team consisting of the author and Vicki Pearce from the Tasmanian Museum and Art Gallery, and Richard Morrison from the National Parks and Wildlife Service. A report on the quantity and availability of relevant historical documentation was prepared by Vicki Pearce (1986). In addition to the sources consulted, the records of Henry Jones IXL are held by the Melbourne University archives. Permission has been obtained from Elders IXL Ltd for the Museum to gain access to these records, which would be essential to a full interpretation and understanding of the site, but their location in Melbourne has prevented their being examined so far. Richard Morrison arranged for a photogrammetric survey of the building's exterior to be undertaken by officers of the Hydro-Electric Commission. The author prepared a preliminary archaeological report which dealt primarily with the remains of ice-making and cold-storage equipment still extant (McGowan 1986).

The building was part of the ice-making and cold-storage facility operated by the jam-making firm of Henry Jones (IXL) from around the turn of the century until the 1970's. Ice was also supplied to the public here. The building, with the exception of its front facade, was demolished in January 1987.

THE SIGNIFICANCE OF COLD STORAGE IN AUSTRALIA'S INDUSTRIAL HISTORY

Farrer (1980: 183–200) discusses the invention and development of refrigeration technology and its significance for Australian trade. Prior to the invention of refrigeration, food was chilled for preservation by means of natural ice. Australia imported blocks of river ice from Canada for use in ice-boxes. However, it was not until the development of mechanical refrigeration that long-term cold storage became reliable and widely accessible.

In the second half of the 19th century, Australia was a world leader in refrigeration technology. James Harrison of Bendigo made the world's first practicable ice-making machine in 1851. He made ice for the somewhat limited local market and later that year a Melbourne brewery installed a machine of its own. In the 1860's, the implications of the invention for the meat export industry were

realised, although it was nearly 20 years before the technology was sufficiently developed to allow frozen meat exports to the United Kingdom. Canada and the United States were packing meat for export to Europe with natural ice, which was easily adequate for the short Atlantic crossing, especially in winter. However, Australian exporters were faced with a much longer journey passing through the tropics. Spurred on by the commercial need to export meat to Britain without loss of quality, various technological improvements took place in Australia in the 1870's, in an atmosphere of intense commercial rivalry and competition (Farrer 1980: 185–188). In 1875, Thomas Mort and Eugene Nicolle opened refrigerated warehouses in Sydney and used refrigeration in the transport and storage of milk and meat from country New South Wales (Farrer 1980: 190). Despite the technical success of the refrigerated sea voyages in the 1880's and 1890's, the appearance of the frozen meat was not acceptable to the customers' taste and this trade declined rapidly after the boom years of the 1890's (Farrer 1980: 258—graph).

However, it was not only the meat that required refrigerated transport. The fruit trade began exporting apples from Tasmania to London in 1884 (Anon. 1899: 387). Initially losses were incurred due to the poor condition of the fruit on its arrival. Tasmania's chief rivals for the London market were Canada and the United States of America. By 1899, cool-storage facilities had been available in those countries for a couple of years, allowing apples to be stored and exported to Europe as required. Tasmania, on the other hand, was forced to export its produce as soon as it was harvested. This meant that Tasmanian producers could not take advantage of fluctuations in the European market and often found themselves competing against cheaper local produce (Anon. 1899: 387–389). Initially Tasmanian fruit was sent via Melbourne, but the extension of refrigerated shipping to Hobart, in 1899, allowed Tasmanian fruit producers to export directly to London, thus reducing some of their costs. However, competition from North America still seriously affected the profitability of the Tasmanian industry. Linge (1979: 646) attributes the eventual success of the Tasmanian industry to cheaper shipping costs, but it is unlikely that full advantage of the reduction could be taken until the provision of cold-storage facilities in Hobart allowed producers the choice of timing their exports. Therefore, it was the introduction of these facilities for the fruit trade which allowed Tasmanian producers to regain their competitive edge in the world's markets.

By the 1930's, a number of cool chambers and cold-storage facilities existed in Tasmania at both Hobart and Launceston. These were used for chilling meat, storing fruit and in the brewing industry. Messrs J. Boag & Son built cool chambers shortly before 1931 to keep their Esk Brewery in Launceston up to date. Bender and Co. Pty Ltd built the first cool store in northern Tasmania at Brisbane Street in Launceston and had another cool store in Hobart at Elizabeth Street; these were used to chill fruit prior to export and smallgoods, and as commercial cold-storage facilities. Also, H. Dunn installed "special chilling chambers" at his butchers premises in Elizabeth Street, Hobart (Anon. 1931: 204, 320, 324).

The provision of cold storage was also significant in the local economy. Most 20th-century freezing works in Launceston and Hobart were established by local businesses primarily to store their own perishable goods. These facilities quickly became important to other small entrepreneurs such as people supplementing their living through rabbit-catching (e.g. *The Weekly Courier* 16 May 1903 and *The Tasmanian Mail* 6 June 1903).

Meat and dairy produce in Australia and France, fish in France and Germany, and beer in Australia, France and Germany were early successful applications for refrigeration technology in the late 1860's to 1890's. Large-scale cold storage for fruit, especially apples, was developed in the USA and UK in the late 1890's. Cold storage for other types of fruit was developed in the early 20th century (Thevenot 1979: 407–422).

THE PROCESS OF MAKING ICE AND COLD STORAGE

The principle of refrigeration is that when a liquid evaporates to a gas or when a compressed gas is allowed to expand, the heat used is taken from the surrounding environment, thus causing cooling. Early refrigeration plants used either carbon dioxide, ammonia or sulphur dioxide as the refrigerant. Of these, ammonia was the most important commercially. In the 1930's, non-toxic refrigerants called "Freons" were developed which were thought to be safe and are still widely used today (Thevenot 1979: 39–43, 55, 253). It has recently been realised that these gases damage the ozone layer of the atmosphere, posing a serious threat to life on the planet.

In the early ice-making plants, the refrigerant gases were discharged into the atmosphere after use. In 1877, Karl von Linde developed his double-

acting horizontal ammonia compressor in order to convert the ammonia gas back into its liquid form for re-use. The compressors were soon manufactured and sold around the world (Thevenot 1979: 445). Kilometres of piping conveyed the refrigerant gases around the plants. The pipes could be immersed in brine to cool it below freezing point, so that buckets of fresh water could be frozen. The cold-storage chambers were also lined with refrigerant piping, which kept the air at a low temperature. Frozen carcasses were hung from hooks attached to rails. See, for example, the illustration of the interior of the La Plata cold storage in Argentina, where hundreds of carcasses could be moved around the chamber by this method (Critchell & Raymond 1912: 84).

DEVELOPMENT OF THE HENRY JONES ICEWORKS

Before the advent of mechanical refrigeration, ice for use in spring and summer was stored in ice-houses on Mount Wellington. These ice-houses were in use from the 1850's until the 1890's by Hobart confectioners, who used the snow and ice to make ice-cream etc. Ice was collected from the mountain in winter and stored in thick-walled stone huts, roofed with wood and turf (Thwaites 1974).

The Henry Jones iceworks was not the first manufactory of artificial ice in Hobart. There were at least two others. Degraes established an Ice Manufactory at Cascades in 1875–76 which was still in use in the 1890's (Thwaites 1974). However, this had closed down by the time Frederick Pender established the Hobart Freezing Company in the New Markets at Lower Macquarie Street in 1897. This was primarily to freeze fish for export but also produced ice for general consumption and provided cold storage for meat and dairy products (Anon. 1899: 318). The Hobart Freezing Company was burnt down in the fire which destroyed the New Markets in 1909. The site is now occupied by the City Hall.

The date at which the iceworks was established at 35 Hunter Street is not as yet known from documentary sources (Pearce 1986: 2). However, a glowing account of the Henry Jones enterprise published in 1899 makes no mention of ice-making, despite detailed descriptions of other operations of the factory (Anon. 1899: 356–359). This strongly suggests that the iceworks was established after that date. The installation of the cold-storage and ice-making equipment required structural alterations to the building, including

reflooring. Richard Morrison has suggested that the addition of a new facade was a part of this reconstruction. The work must have taken place after 1899, when a streetscape photograph shows the old facade (Anon. 1899: 357), but before 1905, as a Beattie photograph taken around that date shows the new facade in place (Sprod 1977: 83). It almost certainly was done at the same time as the building across the laneway at 37 Hunter Street was constructed, as the stylistic details are identical (pl. 1). That building was the Tasmanian Refrigerating Company erected in 1903 (*Tasmanian Mail* 6 June 1903: 25); it therefore seems reasonable to postulate that the cold storage and ice-making facilities at 35 Hunter Street were established at that date, probably as part of the same operation. The technology of refrigeration was well-established by this time, having been developed both in Australia and overseas for half a century.

Meat, poultry, fruit, hops, fish, butter, eggs and other produce were kept in the cold store (Anon. 1931: 192; Jones and Co. 1926; *The Mercury* 28 January 1922: 11). Critchell & Raymond (1912: Appendix VII) list all the major meat-freezing works operating in the southern hemisphere in 1912. The Tasmanian cold-storage facility is not mentioned in their list. As the IXL cold store was almost certainly in existence by this time, its omission probably indicates that it was not primarily used for freezing meat but for chilling fruit.

The first ice-making plant used liquid ammonia as the refrigerant. The process used by Henry Jones (IXL) in Hobart in 1922 was described in *The Mercury* (28 January 1922). To make ice, cans were filled with fresh water and lowered into a tank containing 3000 gallons (11.36 m³) of brine. Liquid ammonia was released through coils of one-inch iron piping lying in the tank and as the ammonia turned from liquid to gas, it drew heat from the surrounding brine thereby reducing its temperature to 12°F. The fresh water in the cans was then frozen solid. Refrigerant pipes also lined the cold-storage chambers to chill the air temperature and conducted the spent ammonia back to the compressors. A total of 13.5 miles of piping was used at the iceworks, 1.3 miles (7000 ft) of which were used in the brine tank (*The Mercury* 28 January 1922: 11). In the early years of the operation the ammonia passed through the pipes as gas and was the released into the atmosphere at the end of the process.

In 1903, a 28-ton Hercules freezing plant was installed at the Tasmanian Refrigerating Company (*Tasmanian Mail* 6 June 1903: 19). By 1922, two Linde wet compressors were in use in conjunction



PLATE 1
The facade of the Old Icworcks (photo: P. Spratt).

with a condensation tower to liquefy the ammonia and thus recycle it; one is illustrated in the *Mercury* article cited above. These machines compressed the ammonia gas which was then pumped through 3.8 miles (20 000 ft) of piping in a condensation tower. Cold water, pumped from the River Derwent, was run over the pipes, cooling the ammonia to a liquid which was then recirculated. There were 22 refrigerating rooms at IXL, providing 450 000 cu. ft (12 750 m³) of space (*The Mercury* 28 January 1922: 11), far more than the seven insulated rooms which survived in the Old Icworcks building at 35 Hunter Street. The other cold-storage rooms, the switchroom and the compressors must have been located in 37 Hunter Street and other nearby Henry Jones properties. At this time there was a 3000 gallon brine tank, the capacity of which was only enough to keep one of the Linde compressors busy. Thirty tons of ice could be made in 24 hours but the actual output was much lower. In December 1921, 104 tons of ice were made. In 1931 it was claimed that most of the ice used in southern Tasmania was made here (Anon. 1931: 192).

PREVIOUS INVESTIGATIONS

The earlier history of the site has been outlined by Pearce (1986). A building was erected on this site, on what was originally Hunter Island, some time between 1830 and 1846, a period of vigorous mercantile expansion. Its similarity to the store and residence built in 1827 at adjacent 33 Hunter Street can be seen in illustrations of the older building (Anon. 1899: 357) and suggests that the two buildings perhaps shared a similar function.

The structure of the iceworcks building has been described by Consulting Chartered Engineer, Peter Spratt of England Newton Spratt & Murphy Pty Ltd, who also surveyed and drew up plans of the building whilst assessing its structural integrity (England *et al.* 1986). It was a three-storey stone building with a separate brick facade. Most of the interior was lined with timber boarding, with the gap filled with charcoal and/or wood-wool insulation. Assuming, as suggested by Spratt, that the building plans originally matched the older adjacent building at 33 Hunter Street, considerable alterations took place at the same

time as the new facade was built, including the insertion of new floor levels and the construction of a new roof.

The exterior elevations of the building were recorded using photogrammetry by the Hydro-Electric Commission under the supervision of Richard Morrison. The interior was considered by Spratt to be too dangerous to allow safe access for the photogrammetry crew, so that area was not covered in the survey. These photographs and glass negatives are stored at the Archives Office of the Tasmanian State Library. Examination of the building by Spratt during and after demolition confirmed that its southeast and northeast walls were part of the pre-1846 building, erected against the earlier adjacent structure at 33 Hunter Street. Timber plates built into the southeastern wall match those in the far wall, showing the southeast wall to be original wall construction and confirming the similarity of the buildings' plans. The northwestern wall was socketed, showing where the floor timbers had been added (P. Spratt, pers. comm.).

ARCHAEOLOGICAL EVIDENCE

One inspection was made of the ground floor of the building on 5 August by the author with A.P. Andrews, Curator of Applied Science. The purpose of this visit was to note the quantity, condition and location of any ice-making or cold-storage equipment, in order to determine what processes took place there and to provide data for an assessment of the cultural significance of any relics.

The three-storey brick and stone structure had various wooden features attached to it. There were a lift and stairway attached to the back (northeast) wall and an adjacent wooden structure which crossed Iceworks Lane at first-floor level (Fig. 1). Only the ground floor was accessible, the first and second floors, laneway structure and rear external structures being inaccessible for safety reasons. The building is not lit by electric or other lighting and there are no windows. The only natural light was that which filtered in through the open front and back doors. Consequently most of the inspection took place by torchlight. A set of record photographs of the ground-floor interiors were taken, which are held at the Tasmanian Museum and Art Gallery. Following this site visit, the building was completely closed for safety reasons, precluding any further access, although it was again inspected during demolition by Richard Morrison and Phil Andrews. Figure 1 shows a plan

of the building based on that prepared by Consulting Engineer Peter Spratt. On it are marked the locations of refrigerating equipment as seen in 1986.

Ground Floor

The ground floor comprised four rooms and an entrance passage, which are numbered rooms 1 to 5 in figure 1. As noted by Peter Spratt (England *et al.* 1986: 2), every room was lined with timber boarding and the gap filled with charcoal insulation.

Room 1 was the entrance hall. There were two remaining ice-chutes in the room. One of these was still in place below the ceiling. Its purpose was to deliver ice to the street through an opening above the front door. The other chute was lying displaced on the floor. In the passage between Rooms 2 and 3 there was a large insulated door with a smaller door inset. Near the front door, the timber lining had come away from the internal wall allowing the charcoal packing to spill out on the floor (pl. 2).

Room 2 was a square room at the front of the building, with a capacity of 25 m³. The northwest and northeast walls and the ceiling were covered with sinuous iron piping (pl. 3), which appeared to be one continuous pipe, held in place against the walls by iron bars and against the ceiling with U-shaped brackets. The purpose of the piping was to convey the low-temperature refrigerant around the cold-storage chambers. The front (southwest) wall had an insulated door through to Hunter Street. The southeast wall had a small square window through to the entrance passage (Room 1), which had an insulated window cover. Below this window there was a quantity of charcoal which had spilled out of the wall and heaped against it.

Room 3 was a narrow rectangular room with a capacity of 34 m³. It had sinuous piping attached to the ceiling. In the north corner were some buckets made from square kerosene-style cans. These were used for making ice in the brine tank.

Room 4 was a wider rectangular room with a capacity of 48 m³. The southwest wall had an insulated door through to the entrance passage. The northeast wall had a window opening through to Room 5. The ceiling was covered with sinuous piping.

Room 5, with a capacity of 39 m³, occupied the whole width of the northeast side of the building. It had sinuous piping on part of the ceiling. The rest of the ceiling area was occupied by the base of a

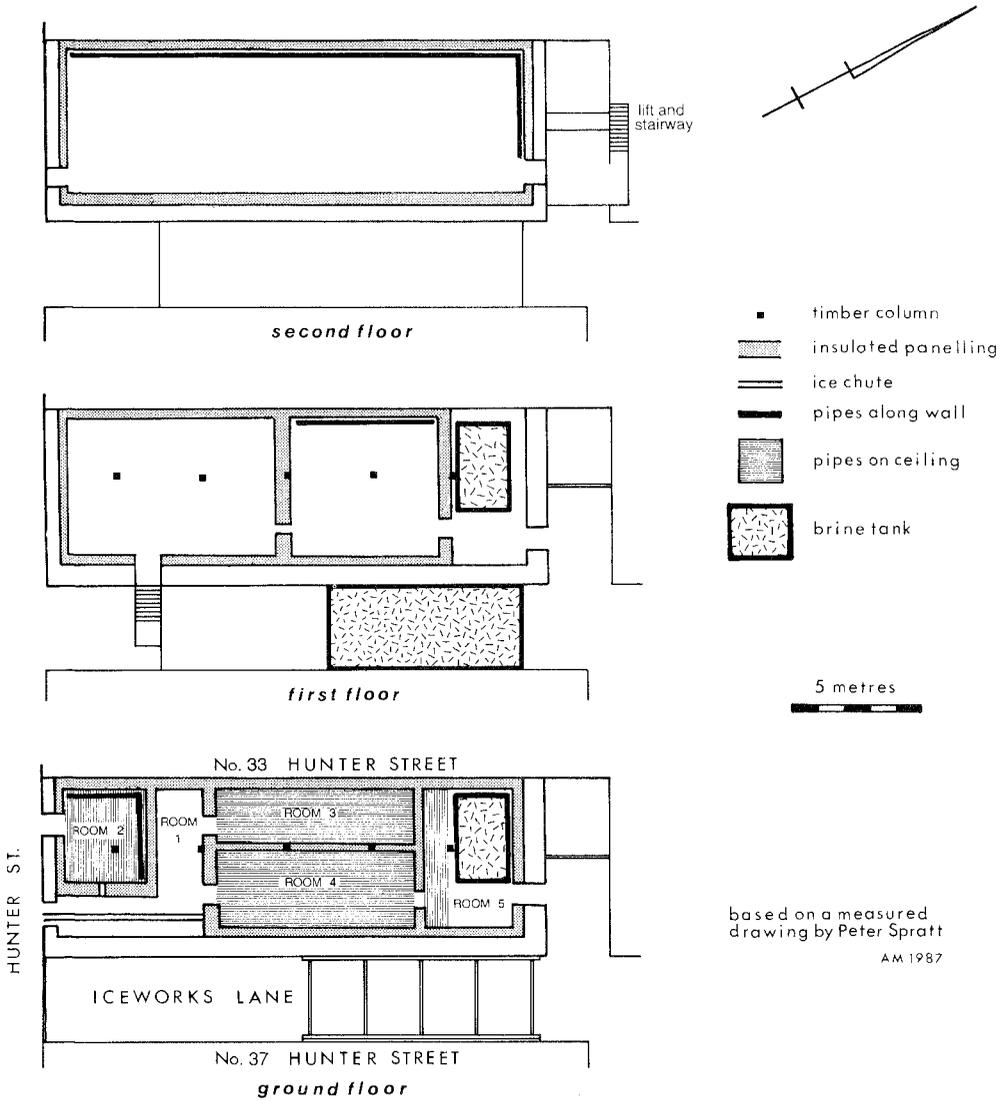


FIG. 1 — Plan of the Old Iceworks, 35 Hunter Street, Hobart, showing the location of equipment, August 1986.



PLATE 2
Charcoal insulation in Room 1.

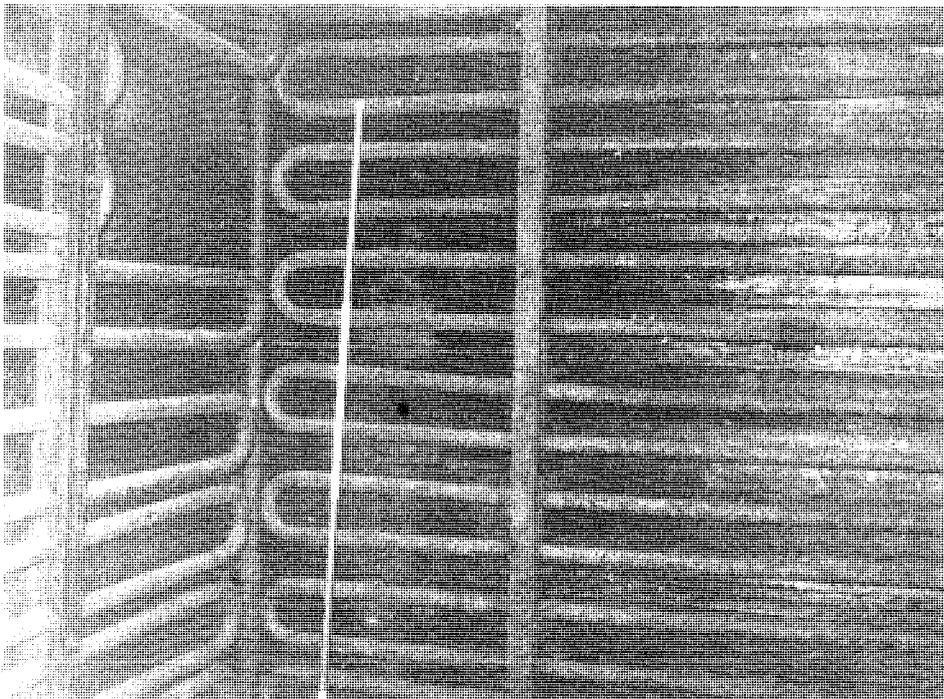


PLATE 3
Refrigerant piping lining the walls in Room 2.

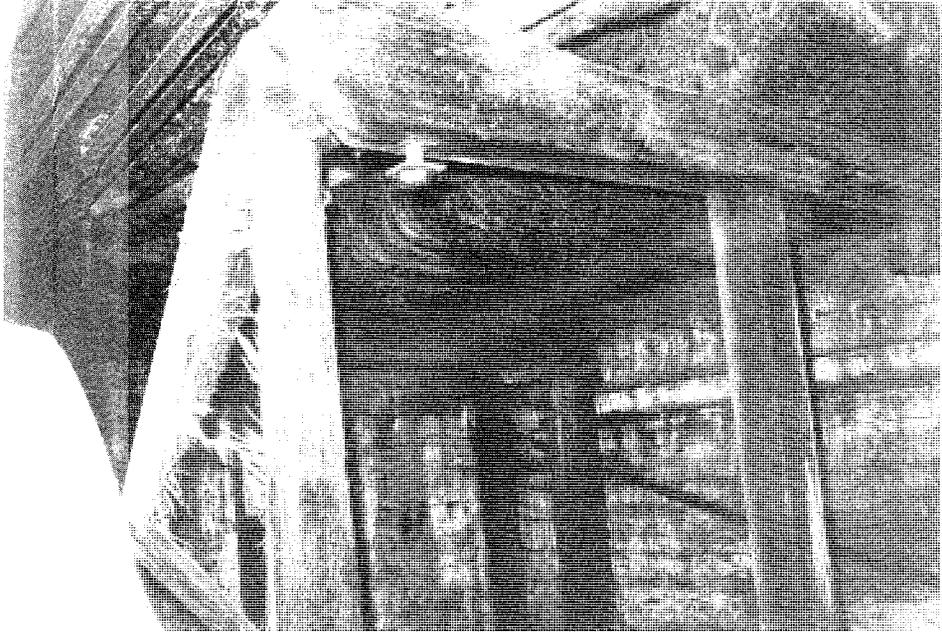


PLATE 4
Base of the brine tank visible in the ceiling of Room 5.

large iron tank which projected down from the floor above (pl. 4). This has been provisionally identified as a brine tank. Larger diameter pipes, insulated with wood-wool and some synthetic insulating material, ran the length of the building below the ceiling of Rooms 4 and 5.

First Floor

The first floor was not examined by the author. The plan of the building shows two insulated rooms, at the front and in the centre, and one smaller uninsulated room at the rear northeast end. The capacity of the two insulated rooms is 92.5 m³ and 67 m³. Photographs taken by Peter Spratt show some refrigerant piping in the central room and some ceiling rails and hooks in the rear uninsulated room. These rails were probably for moving frozen goods around the chambers. During demolition the brine tank, the base of which was seen in the ceiling of the room below, was noted in the rear uninsulated room. It had an approximate capacity of 6 m³.

The Laneway Structure was functionally related to the first-floor section of the iceworks. Large pipes ran from 35 Hunter Street through to this structure. The structure itself was not examined by the author, for safety reasons. During demolition, a second iron brine tank, occupying the back-half of the Laneway Structure, was noted by Peter Spratt. The masonry walls on both sides of this tank (at 35 and 37 Hunter Street) had been shattered by freezing, necessitating the demolition of the Laneway Structure and the wall of 35 Hunter Street (P. Spratt, pers. comm.).

Second Floor

The second floor was not examined by the author. The plan shows one large insulated room occupying the entire floor, with a capacity of approximately 213 m³. Photographs taken by Peter Spratt show refrigerant piping against at least one wall (the northeast wall) and possibly also the northwest wall. At least one wall had no piping against it.

Miscellaneous

The outside rear of the building had a lift and a stairway. These were not examined for safety reasons. The facade has four windows painted with gold lettering which read "Cold Storage for Butter, Cheese, Poultry, Eggs and Fruit", ... illegible ..., "John Paterson" and "Direct Exporter of Rabbits & Hares" (pl. 1). The roof had some items of small portable equipment including ice-buckets on it. Artefacts associated with the iceworks were also found in other parts of the Henry Jones sites. These included switches used to operate the compressor, which were mounted on composition slabs stacked in an adjacent hall to the north of the iceworks.

DISCUSSION

The available historical evidence indicates that an iceworks was established at 37 Hunter Street in 1903 and in 35 Hunter Street before 1922. The physical evidence clearly suggests that the installation of the refrigerant equipment in 35 Hunter Street necessitated major alterations to the existing building. Morrison (pers. comm.) has suggested that these alterations were most probably carried out when the brick facade was added. This probably occurred in 1903, at the same time as the dated matching facade was built at 37 Hunter Street. Therefore, the material evidence points to a date of 1903 for the installation of the refrigeration equipment at 35 Hunter Street. By this time refrigeration was a well-established and widespread technology in Australia, although its application to fruit storage was a fairly recent innovation.

The surviving iceworks at 35 Hunter Street, known as "The Old Iceworks" was in fact only a part of a much larger facility for the Henry Jones (IXL) jam factory, consisting of 22 rooms. The old iceworks building contained nine rooms altogether, seven of which were insulated and six of which had refrigerant piping lining the walls and/or ceiling. The insulated and refrigerated capacity of the building is given in table 1. The total volume of insulated space available in this building was approximately 523 m³ and the refrigerated space 430 m³, compared to 12 750 m³ (450 000 cu. ft) reported earlier (*The Mercury* 28 January 1922), suggesting that most of the cold-storage facilities were located elsewhere in the complex.

Two brine tanks on the first floor and an ice-chute leading from the first floor to an outlet above the front door indicate that ice was also made on

these premises. One of these tanks had been installed partly in the ceiling of the ground-floor back room and would therefore appear to be part of the original iceworks equipment. The capacity of this tank was about half of the one described in 1922. The other tank occupied half of the first-floor level laneway structure. This tank appears to have had a larger capacity than the 3000 gallon tank described in 1922. Although only one tank was mentioned, the increase in capacity suggests that this expansion of the iceworks had taken place by that time and that most, if not all, the ice-making was undertaken in this building.

The conservation status of early iceworks and ice-making equipment in Australia is poor. As far as the author has been able to ascertain, there are no iceworks in Australia which are preserved or protected or recognised in heritage listings such as the National Trust classifications and the Register of the National Estate. Also, no museum has a collection of early cold-storage equipment, although the Museum of Victoria holds a Werner compressor, made at Richmond, Victoria, which is in first-class order (Birmingham *et al.* 1979: 138).

Birmingham *et al.* also illustrate (1979: 137) an ice and fish-freezing works at Batemans Bay, New South Wales, which, at that time, still had some of its 11 km of piping, despite being used as a garage. However, there are no remains of Harrison's Melbourne works, and Mort & Nicolle's Sydney works have disappeared since 1970 (Birmingham *et al.* 1979: 137). It is thought that there are now no remains of ammonia iceworks in New South Wales (L. Newell, pers. comm.). In Victoria, remains of at least two early iceworks still survive. At Geelong there is an early refrigerating plant, although the

TABLE 1

Capacity of Insulated Rooms in 1986

Location	Capacity m ³	Refrigerated	
Ground floor —	Room 2	25.8	yes
	Room 3	34.8	yes
	Room 4	48.7	yes
	Room 5	39.8	yes
First floor —	Room 1	uninsulated	no
	Room 6	92.5	no
	Room 7	67.6	yes
Second floor —	Room 8	uninsulated	no
	Room 9	213.5	yes
Total refrigerated space	430.2		
Total insulated space	522.7		

equipment is in bad condition, and at Abbotsfield the engine room, including the carbon dioxide compression equipment, still exists at the Abbotsford brewery (B. Sidebottom, pers. comm.). In Tasmania, Benders freezing works at Launceston still has its sawdust insulation, although no machinery survives (Morris-Nunn & Tassell 1983: 416).

Particular items of working equipment are more likely to survive. Birmingham *et al.* (1979: 137) mention two Ball's Giant and one Linde compressor that were still in operation in 1979. In this context, the loss, though unavoidable, of the Hobart iceworks site is a matter of regret. It represented an industrial function which was important to the development of Tasmania's fruit-processing industry and export trade from the early 20th century. The iceworks and cold storage were typical and representative of the large numbers of early 20th-century refrigeration facilities throughout Australia. Sadly, very few examples still survive.

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