

May 2015



CHESHIRE WEST
AND CHESTER

THE ALLIANCE AND LION SALT WORKS, MARSTON, NORTHWICH

Volume IV – Historic Building Recording |
Chris Hewitson

Title	The Final Report: Volume IV – Historic Building Recording
Authors	Chris Hewitson – Lion Salt Works, Senior Environment Officer
Derivation	
Origination date	27/05/2014
Reviser	Chris Hewitson
Date of last revision	
Version	Final
Status	
Summary of changes	
Circulation	Andrew Davison (English Heritage), Mark Leah (CWAC – Planning Advisory Service), Katherine West (CWAC – Museum Services), Richard Andrews (CWAC – Project Delivery Management)
Required action	
File name/location	O:/ Lion Salt Works
Approval	

THE ALLIANCE AND LION SALT WORKS, MARSTON, NORTHWICH

SCHEDULED MONUMENT NO 34985-002

THE FINAL REPORT:

VOLUME IV – HISTORIC BUILDING RECORDING

REPORT NO 2015-01



Chris Hewitson
Senior Environment Officer
Regeneration and Culture
Cheshire West and Chester

chris.hewitson@cheshirewestandchester.gov.uk

May 2015

Version 1

CONTENTS

1.	THE HISTORIC BUILDING RECORDING	4
2.	THE HISTORIC CORE	5
2.1	STOVE HOUSE 1 (THE LINK BLOCK)	5
2.2	PAN HOUSE 2	16
2.3	STOVE HOUSE 2.....	24
2.4	THE PACKING AREA, LOADING BAY AND WALKWAY	32
2.5	CHIMNEYS 1 AND 2	39
2.6	PAN HOUSE 3	43
2.7	STOVE HOUSE 3.....	51
2.8	PAN HOUSE 4	57
2.9	STOVE HOUSE 4.....	66
3.	PAN AND STOVE HOUSE 5	71
3.1	PAN HOUSE 5	71
3.2	STOVE HOUSE 5.....	80
4.	PERIPHERAL BUILDINGS.....	90
4.1	RED LION INN	90
4.2	THE BRINE TANK.....	97
4.3	THE SOUTH-EASTERN FISHERY PAN AND CHIMNEY 3.....	104
4.4	THE PUMP HOUSE.....	107
4.5	THE BOILER HOUSE AND COAL STORE	111
4.6	THE MANAGER’S HOUSE.....	113
4.7	THE SMITHY.....	120
5.	THE MACHINES AND SALT VAN	126
5.1	CRUSHING MILLS AND CUTTING MACHINES.....	126
5.2	THE SKIMMING MECHANISM AND DRYING CONVEYORS	132
5.3	THE BRINE EXTRACTION APPARATUS	137
5.4	THE ABRAHAM LORD, ROCHDALE STEAM ENGINE	155
5.5	THE LINE SHAFTING, GUILLOTINE PUNCH AND BENCH SAW	161
5.6	THE SALT VAN	164
6.	OTHER BUILDINGS	168
6.1	CORONATION SALT STORE	168
6.2	DISMANTLED BUILDINGS: THE WALLER’S HUT	171
6.3	DISMANTLED BUILDINGS: THE CART SHED AND LEAN-TO BUILDINGS.....	171

1. THE HISTORIC BUILDING RECORDING

The historic building recording (HBR) of the standing structures of the Lion Salt Works was undertaken to the equivalent of a Level 4 survey in accordance with guidelines produced in 'Understanding Historic Buildings'.¹

It involves a comprehensive analytical record of the buildings as can be currently understood. This has been undertaken using a contextual method of recording in order to relate description to specific elements of the building (i.e. each specific element of the building has been given a numeric value to help differentiate it from other elements). The numeric system continues sequentially from the system used above for below-ground archaeological remains. For clarity the numbers are as follows;

- 5000-5999 The Red Lion Inn, the 2009 enabling works and Moveable Objects,² Removed Material, Collapsed Timber
- 6000-6999 The Historic Core Standing Buildings

A database describing each element in detail is provided in the archive.

The recording of the buildings was undertaken in several stages and involved analysis of historic records and photographs.

In 2004 a laser scan was undertaken of the building and this forms the basis of the drawn record of the buildings in the historic core. Subsequent recording has supplemented the areas not recorded during this survey.

In 2009 Pan and Stove House 5, elements of Pan House 2 and Stove House 1 were dismantled. The recording of Pan and Stove House 5 was originally undertaken in 2009 by Andrew Fielding of Vale

Royal Borough. This is documented in a brief report and photographic survey.³ The following represents a full description of the buildings including previous historic photographs taken between the 1980s and the 1990s and represents a record of the historic buildings and the remains that existed in 2009. Currently this has not been amalgamated into the contextual record of the site. At this time further laser scanning was undertaken and the drawings updated.

The recording of the buildings in the historic core were completed to Level 4, as above, during 2012 both before and after the propping of the buildings. This included recording of Pan House 3, PH3; Stove House 3, SH3; Pan House 4, PH4; Stove House 4, SH4; Stove House 1 or the Link Block, SH1; Pan House 2, PH2; Stove House 2, SH2; the Packing Area, PCK; the Loading Bay and Walkway, LBW and Chimneys 1 and 2, CH1, CH2.

The peripheral buildings were recorded from 2012 to 2013. This included the Red Lion Inn, RLI; Brine Tank, BTK; Nodding Donkey NDK; Over-ground Flue, OGF; The Pump House, PMP; Chimney 3, CH3; Boiler House, BH; Manager's House, MHO and the Smithy, SMY. Existing drawings were used from original Cheshire Architectural Surveys dating to 1987, Donald Insall Associates surveys, new survey work undertaken by Oxford Archaeology North and hand-drawn surveys by the Project Archaeologist.

The machines on site were recorded by the Project Archaeologist in 2013. This included the crushing mills and cutting machines; the automated skimming and drying mechanism; the brine extraction mechanism; the Abraham Lord steam engine; line shafting; guillotine and punch; bench saw and the Salt Van.

A series of other buildings were briefly recorded. This included a brief archive record of the Coronation Salt Store and records of the former Waller's Hut and Cart Shed based on photographic evidence and archive records.

¹ English Heritage 2006

² Moveable Objects are defined as artefacts, objects that have been disposed of as they are not integral to the building and elements of the building that have collapsed/ decayed or been removed and stored.

³ Fielding 2010

2. THE HISTORIC CORE

The historic core includes the recording of Stove House 1, SH1; Pan House 2, PH2; Stove House 2, SH2; Pan House 3, PH3; Stove House 3, SH3; Pan House 4, PH4; Stove House 4, SH4; the Packing Area, PCK; the Loading Bay and Walkway, LBY and Chimneys 1 and 2, CH1, CH2.

2.1 STOVE HOUSE 1 (THE LINK BLOCK)

Historic Background

Stove House 1 was originally in the area of the yard of the Red Lion Hotel at the front of the site onto Ollershaw Lane. The hotel dates to the late-18th to early 19th century. It first appears on the 1846 Marston Tithe Map.⁴ The area of Stove House 1 was an open yard. This was later depicted as the coal yard on the 1868 Sale Plan.⁵ The south-west corner of the coal yard was curved to accept cart deliveries from Ollershaw Lane and this in part may explain the unusual shape of Stove House 1 (see below). The 1880 Sale Plan depicts this with even greater detail.⁶

In 1894 The Thompson's re-established themselves as a family business again when they constructed a salt works in the coal yard of the Red Lion Hotel, Marston. The purchase of the Red Lion Hotel in 1894 for John Thompson Jnr's works (Phase 4) resulted in the construction of a new pan and stove house (No. 1): the pan house was located in the plot adjacent to Ollershaw Lane by the canal,⁷ whilst Stove House 1 represents the remains of the other building.

The buildings are first depicted on the 1898 2nd edition Ordnance Survey Map.⁸ The pan house can be seen orientated north-south with the stove house aligned east-west in an L-form. Both south-west and south-east corners of Stove House 1 were curved (this is still notable in the underlying fabric of Stove House 1 and 2). A passage is clearly denoted running north-south through the centre of the stove house and east of the pan house. This

corresponds with the underground passage on site (see below).

The original flue layout is clearly shown on a plan.⁹ This shows air circulating in a curved direction from the pan north-east to south-east before passing east-west. Pan House 1 and four fishery salt pans are shown on the 'Stock List Plan' of 1900 as part of the expanded complex.¹⁰ The plan appears to have been altered to accommodate Stove House 2, possibly with the demolition of an internal wall to allow an open plan. This is depicted on the 3rd edition Ordnance Survey Map of 1910.¹¹

The passage is shown to continue north to abut the canal. This would appear to suggest it was designed for delivery of coal to the stoves or chimney. There was a passageway to the east, and a loading platform above the passage from which narrow boats were loaded. Chimney 1 (see below) is depicted on this map between Stove House 1 and 3 and would appear to have served both complexes. Chimney 2 is absent and suggests that the flues of Stove House 2 also passed to this chimney.

The construction of Pan and Stove House 3, resulted in an awkward junction with Stove House 1. Stove House 3 directly abutted Stove House 1 to the north and the two shared a wall (see below). The roof structure cannot be discerned on these early maps. It is visible on a c. 1947 aerial photograph¹² as a surviving pitched roof structure aligned east-west over Stove House 1 with a series of valleys connecting to the north-south aligned pitched roof of Stove House 3. A similar awkward junction is visible with Stove House 2. This suggests that the later roof structures were inserted onto the pre-existing Stove House 1 structure.

Pan House 1 is also visible on this photograph as a hipped roof structure. Notably it is hipped at both the northern and southern ends (unlike other later examples on site, e.g. Pan Houses 3, 4 and 5). This

⁴ Volume II, 2.2

⁵ Volume II, 2.3

⁶ Volume II, 2.4

⁷ Matrix 2011, gazetteer no. 7

⁸ Volume I, 5.5

⁹ Volume II, 3.23

¹⁰ Volume II, 3.52

¹¹ Volume II, 3.51

¹² Matrix 2011, fig. 11

would be because the pan house was aligned perpendicular to the stove house unlike later examples.

It is not clear when Stove House 1 became redundant as an active pan and stove house. The adjacent Stove House 2 was converted to an automatic drying system in the late 1960s (see below) and it is unclear how this affected the adjacent structure. It is known that by the 1980s Pan House 1 was in a very poor state and was demolished. The warehouse level was interconnected with Stove House 3 and almost certainly continued to be used during the active lifespan of the works up until 1986.



2.1: Collapse of Stove House 3, north gable, 1990s, south facing



2.2: Collapse of Stove House 1, 1990s, west facing

Stove House 1 appears to have become structurally unsound in the 1990s and in the early 2000s the roof connected to Stove House 3 collapsed (2.1, 2.2). The collapse was almost certainly the result of the poor condition of the roof structure and the subsequent collapse of the southern wall which was shared with Stove House

3. The southern half of the roof structure and collapsed floor surface was dismantled as part of the 2009 enabling works (reported below).

Description

The stove house in its original form was aligned east-west (see BS047, BS048, BS049; 2.3, 2.4). The now demolished Pan House 1 lay to the north in what is now the pan garden. It was a one-and-a-half storey building built in machine pressed red brick in English Garden Wall bond. Of the four elevations only substantial remains of the western and northern elevations survived. The southern elevation had collapsed almost entirely with fragmentary remains of the wall surviving where it conjoined Stove House 3 and adjacent to Chimney 2. The eastern half of the northern and southern elevation and the eastern elevation had been almost entirely subsumed into the construction of Stove House 2 and only fragmentary remains survived.



2.3: Stove House 1, 1980s, south-east facing



2.4: Stove House 1 and Stove House 2, 1980s, south-east facing

Exterior

The principal elevation faced north where it was formerly abutted by Pan House 1 (collapsed and demolished in the 1980s, BS052, BS054, see Volume II, 3.16). Unlike Stove Houses 3, 4 and 5 where the pan houses joined the gable elevation,

Pan House 1 abutted the northern long elevation. Originally the northern elevation continued to the east, but it was demolished when Stove House 2 was constructed. The northern elevation was a single storey high, plain and constructed in hand-made red brick in English Garden Wall bond (6505; 2.5). A second phase of rebuilt wall in machine pressed yellow bricks was visible on the eastern upper side of the wall (6928). The brick type corresponded closely with re-built areas of brickwork on Stove House 2 on its western and eastern elevations (see below). A single pier of machine-pressed red brick supported the structure on its north-western corner (6502).



2.5: Stove House 1, north facing elevation, south facing



2.6: Stove House 1, east facing

The foundations of the northern elevation were poor.¹³ At the eastern end the wall was supported on an eroded ferrous metal beam that spanned the tunnel as it passed north-south under Stove House 1. Centrally a further ferrous metal beam

¹³ see Volume IV, Appendix I, Test Pit 24; Test Pit 27 and 28; HC34

ran under the wall where the flues passed from Pan House 1 into Stove House 1. At the western end the foundations were deeper but still only appeared to extend to a depth of 2-3 courses.

The pitched roof was of plain cement asbestos (6506; 2.5). At eave level on the eastern end was a dormer doorway, with gable end facing north (6507). A double doorway formerly gave access to the upper pan level of Pan House 1. Only one of the two plank and baton doors survived (6544) whilst the other lay adjacent on the floor.

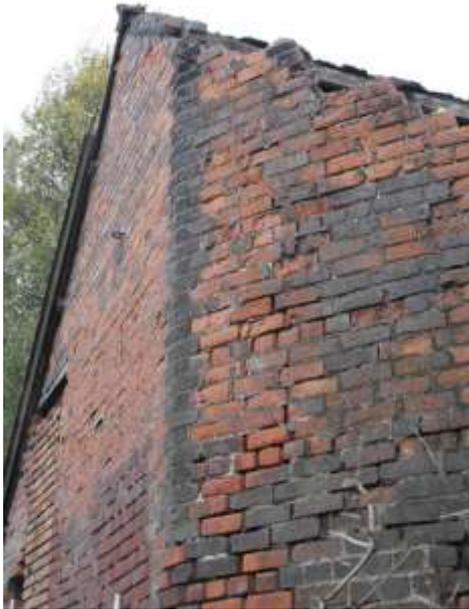
The western gable end was constructed in hand-made red brick (6501; BS050, BS053, 2.6, 2.7). The gable faced Ollershaw Lane before curving north-west to south-east towards the southern elevation (6500; 2.8, 2.9). This allowed space for Chimney 1 (6509) to be accommodated but also followed the original alignment of the entrance to the Red Lion Hotel (Phase 2). A line of blue bricks defines the corner of the building. It had a single bay with a wooden casement window (6503) at ground floor level. Directly above at first floor level was a blocked doorway opening with wooden lintel (6504; 2.7, 2.10 from interior). The wall was partially dismantled in 2009 and the gable almost entirely removed.



2.7: Stove House 1, western gable, east facing

The southern elevation was almost entirely collapsed (Fig. BS070). It survived as a low line of machine-pressed red brick in English Garden Wall bond, with a single fragmentary upstanding wall (6194) continuing from the curve (6500) of the western gable wall. The single storey wall survived to the full height in one area (2.11). The whole of the first floor was formally open allowing direct

access between Stove House 3 and Stove House 1
(see 2.12)



2.8: Stove House 1, western gable, north-east facing



2.9: Stove House 1, curved south-west wall, north-west facing



2.10: Stove House 1, west gable, gable from interior, east facing



2.11: Stove House 1, southern elevation, remnant wall, south facing



2.12: Stove House 1 from Stove House 3, north facing

At the eastern end the wall had been incorporated into the Stove House 2 outline (visible as wall 6434; see BS070, 2.13). However, the majority of the wall had been demolished and replaced by later walls along similar alignments (see Stove House 2 below; 6433, 6435, 6436, 6437, 2.13, 2.14). The pitch of the roof had been entirely lost on the majority of the southern side of the building. It survived only as a small area within the fabric of Stove House 2 (Fig. BS070, 6552, 6553, 6554, 6555, see below).



2.13: Stove House 1 and 2, remnant walls of earlier Stove House 1, 6433, 6434, 6435, east facing



2.14: Stove House 1 and 2, replaced eastern wall, 6436, 6437, east facing

The eastern elevation had almost entirely disappeared. The ground floor brickwork had collapsed and been replaced (see Stove House 2 below). At first floor level partial survival of the original gable (6595) was visible as wooden remains of a double doorway (see Fig. BS075, Plate 2.15, 2.16). This was recorded in 2002 but had collapsed by 2012, with the remains of one of the doors lying on the floor (5145). The doors were of plank and baton construction.



2.15: Stove House 1 and 2, survival of the eastern gable, east facing



2.16: Stove House 1, roof line as seen from the Packing Area and Loading Bay, east facing

Interior Tunnel Level (Basement)

Running north-south centrally through the interior of the stove house was a wide tunnel (BS047, BS070, 2.17, 2.18). Access was restricted at this stage of the project as no formal survey had been undertaken on the roof. At its southern end it turned from north-south and ran to the south-east and base of Chimney 2 (6430).

Both western and eastern walls were of hand-made red brick in English Garden Wall bond (6526, 6527). The entrance had a lintel made of two ferrous metal I-beams overlaid by a single sheet of ferrous metal (6525, see 2.19, 2.20). The roof of the tunnel was of sheets of ferrous metal, the main part of which formed a trough (6529). In the entrance this cover was a sheet of ferrous metal (6528), with a single small hole presumed to be for drainage. This had eroded and collapsed at the northern and southern ends. The tunnel presumably continued to the north and ran

adjacent to Pan House 1 where it joined the canal. Change in transport presumably lessened the necessity for canal access over time.



2.17: Stove House 1, tunnel entrance, north-west facing



2.18: Stove House 1, tunnel, north facing



2.19: Stove House 1, ferrous metal sheets over the tunnel entrance, west facing



2.20: Stove House 1, ferrous metal sheets over the tunnel entrance, north facing

Interior Flue Level (Ground Floor)

The interior flue level was originally uncovered in 2009 (BS047, 2.21, 2.22). A series of seven north-south flues ran up and down the stove house (6511-6517; 2.23, 2.24). The western flue (6511; 2.25), curved around following the line of the western gable wall. The eastern flue ran over the remains of the tunnel and continued into Stove House 3. These were defined by single skin thick brick walls of machine-pressed bricks in Stretcher bond. Between each wall were solidified layers of salt. Along the northern side of the building ran an east-west flue, of which no trace survived (2.26), visible as a trace of the structure defined by an absence of floor level. The equivalent southern flue was shared with the northern flue of Stove House 3 (6141). The majority of the salt layers were excavated in 2009 and the brick walls were reduced in height. The eastern side of the flue level had been entirely altered to accommodate the remains of an automated drying system (see Stove House 2 below).



2.21: Stove House 1, interior flue level, 2009 enabling, east facing



2.22: Stove House 1, interior flue level, 2009 enabling, south-west facing



2.23: Stove House 1, north-south flues as uncovered in 2009, south facing



2.24: Stove House 1, interior in 2012, south facing

The warehouse level floor above was supported by a series of columns. The columns were a mix of original circular cross-section, ferrous metal columns (6518, 6519, 6520, 6521, 6524; 2.28) and later inserted I-beams acting as columns (6522, 6523, 6547, 6548; 2.27).



2.25: Stove House 1, western flue 6511, north-west facing



2.26: Stove House 1, interior, west facing



2.27: Stove House 1, Columns supporting warehouse floor, north-west facing



2.28: Stove House 1, columns supporting warehouse floor, south facing

Many of the columns had been removed during 2009 enabling works and were temporarily stored in the Packing Area (5138). These supported a series of seven north-south aligned wooden transverse beams (6530-6534; 6602, 6603) which in turn supported the warehouse floor. The original beams (6602, 6603) survived in the eastern side of the building, but had been adapted to accommodate Stove House 2. They were tied directly into the southernmost, east-west transverse beam (6589) of Stove House 2 warehouse floor. At the southern end they were supported by the fragmentary remains of the Stove House 1 wall (6434) and a wooden post (6637).

Interior Warehouse Level (First Floor)

The interior warehouse level had almost entirely collapsed (Fig. BS048). The floor of the warehouse survived in 2009 more extensively but by 2012 it survived only three places. Large 3" thick floorboards were aligned east-west between each bay (defined by the transverse beams). These survived in the north-west corner (6535, see 2.29, 2.30, 2.31, 2.32); in front of the dormer gable in the northern elevation (6536, 2.33) and as floorboards where Stove House 1 and 2 (6607, 2.34) were combined. Trimmers (6604, 6605) had been added to strengthen this floor. A series of three salt hatches (6619, 6620, 6621) were located in the eastern surviving part of the floor. These were rectangular (0.90m x 1.00m) and supported by trimmers on east and west side. One these hatches (6621) had the salt hatch still in place.



2.29: Stove House 1, warehouse floor, 2009 enabling works, west facing



2.30: Stove House 1, warehouse floor, 2009 enabling works, north facing



2.31: Stove House 1, warehouse floor, 2009 enabling works, east facing



2.32: Stove House 1, warehouse floor, in 2012, east facing



2.33: Stove House 1, warehouse floor, eastern end north facing



2.34: Stove House 1 and 2, warehouse floor, north facing

Originally in 2009 a much greater extent of floor existed throughout the warehouse. The roof collapse in the early 2000s resulted in water ingress and the majority of these timbers were rotten and were removed during the 2009 enabling works. The pattern of floorboards and salt hatches was however, still broadly visible (2.35, 2.36). This suggested that a combination of one or two hatches were spaced equidistant in each bay.



2.35: Stove House 1, pattern of salt hatches visible in 2009, west facing



2.36: Stove House 1, surviving salt hatch in 2009, north facing

The roof structure survived poorly. Almost the entirety of the southern side of the roof structure had collapsed, been altered or been dismantled, meaning that the structure as a whole survived only fragmentarily. The roof structure consisted of

a series of seven aisled trusses (6537-6541; 6552, 6553; see BS049, BS050, BS052, BS070) supported below on the transverse beams. The majority of these trusses had been altered in some way to accommodate the insertion of both Stove Houses 2 and 3 into the roof plan. Only two survived completely intact (6537; 2.29, 2.30; 6541, 2.37, 2.38). This had made the roof structure fundamentally weak. The three between (trusses 6538, 6539, 6540; 2.29, 2.30, 2.31, 2.32) had been entirely removed on the southern side by the insertion of Stove House 3. The roof structure had collapsed and been dismantled during 2009 enabling works. The northern side adjacent to Stove House 2 (trusses 6552, 6553) had been entirely removed to accommodate the new building.



2.37: Stove House 1, Truss 6541, east facing



2.38: Stove House 1, Truss 6541, north-east facing

Aisle rafters were originally supported on either side by wall plates and centrally by a row of seven aisle posts. The aisle posts were mortice and tenon jointed into the transverse beams. The rafters were braced with a tie beam and king post. The king post was carried through to the apex and rafters mortice and tenon jointed to it. Carpenter's

marks were visible on a number of the surviving timbers (see 2.39, 2.40).



2.39: Stove House 1, carpenter's mark on truss



2.40: Stove House 1, carpenter's mark on truss

On the northern side were a series of five staggered purlins (6543, 2.41), with each member running for a single bay. They were supported by a simple clasp joint on the principal rafters (2.42).



2.41: Stove House 1, staggered purlins 6543, west facing



2.42: Stove House 1, staggered purlins 6543, west facing

The addition of Stove House 2 had seen the loss of staggered purlins between the eastern bays (2.43). On the southern side two sets of purlins (6554; 2.44) only survived at the very eastern end.



2.43: Stove House 1 and 2, showing the removal of all remains of the trusses and purlins on the northern side, north facing



2.44: Stove House 1 and 2, showing the surviving extent of purlins on the southern side, south facing

The roof structure was covered with a layer of softwood planks prior to covering with felting and corrugated asbestos cement sheets (6506; 2.45, 2.46).



2.45: Stove House 1, original surviving remains of roof, in 2009, north-west facing



2.46: Stove House 1, felted roof covering in 2009, north-west facing

Phased Interpretation

Phase 4: The stove house was originally constructed in Phase 4 (c. 1894) as the earliest element of the Lion Salt Works. Traces of the original fabric are still visible on the northern, western and southern façades and these appear to match the original plans preserved in the Lion Salt Works collection. This has been supported by the excavated evidence from the southern wall (see Volume III). It was two stories high with the flue level fed by the now demolished Pan 1 to the north (formerly located in the Pan Garden). Originally the flues curved around following the curved line of the eastern and western walls. The flues on the eastern side (now in Stove House 2) have been entirely lost whilst those on the western side they were possibly altered to run directly into Chimney 1.

The central tunnel appears to have been built to allow direct access from the canal. Its location and

orientation suggest it allowed coal to be taken directly into the centre of the works, including the location of the fishery salt pans. The warehouse level originally covered the entire footprint including Stove House 1 and the southern part of Stove House 2. The floor level survived only partially but appeared to include an equidistant spaced arrangement of salt hatches for lofting salt onto the first floor level from the flues.

Phase 5: The addition of Stove House 2 (to the north) and 3 (to the south) resulted in the alteration of the trusses to accommodate the adjoining roof space. This created continual flow through the stove houses of the building from Stove House 3 to 1, and onwards to Stove House 2. This would allow processed salt to be directly moved from one end of the works to the canal and allowing loading onto the canal. In addition a walkway probably passed from the dormer doorway on the northern elevation along the western side of Stove House 2.

Phase 7: The flue designs were altered radically in the 1970s. The original design appeared to pass into Chimney 2. This was possibly altered to pass into Chimney 1. An automated skimming and drying system was inserted in the late 1960s or 1970s (see below, Stove House 2) and resulted in further loss of the ground floor fabric in the eastern and south-eastern part. By the 1970s probably around 40-50% of the original fabric of the Stove House survived intact. This appears to have resulted in the alteration of the flue design in the western part. It ran directly from Stove House 3 to the south and connected through to Stove House 1 to form a massive flue level for drying. This probably occurred after Pan House 1 went out of use (possibly as early as the late 1960s or 1970s). The passage of hot gases from Pan House 3 was controlled by damper plates located adjacent to Chimney 1. These were controlled remotely by a series of pulleys and weights that are still visible in the fabric of Stove House 1 and 3.

Phase 8-9: The collapses of the early 2000s and the subsequent clearance in 2009 means that less than 20-30% of the original fabric of the building survived and what remains was in poor condition.

2.2 PAN HOUSE 2

Historical Background

The location of Pan House 2 lay to the north of the Red Lion Hotel. The area is shown on the 1846 Marston Tithe Map¹⁴ with a series of buildings forming a court,¹⁵ C-shaped in plan, extended between the original Red Lion Hotel¹⁶ and the canal towpath. The buildings are probably broadly contemporary with the hotel and date to the early part of the 19th century. The best depiction of these buildings dates to c. 1880 Sale plan for the Red Lion Inn.¹⁷ This shows a row of cottages with a side passage which face the canal to the north, a north-south range of stables to the west and a further set of cottages to the south abutting the Red Lion Hotel. There is a reference to a cholera outbreak having occurred here (see Volume I). The complex of buildings was adapted into the newly formed works of John (Junior) and Henry Ingram Thompson in 1894 and survived the initial years of the works.

The buildings were demolished around 1898-1900 (Phase 5) as part of the expansion of the works. This resulted in the demolition of both sets of cottages. It is arguable that some elements of the stables may have been adopted in Stove House 2 (see below).

Pan House 2 was built in its current location orientated east-west perpendicular to Stove House 2. The extent of the original stove is not entirely apparent. The remains of a brick base associated with a steam engine that powered the original crushing mill in Stove House 2 (see below) suggest that the location is probably original and adopts a similar footprint. It is depicted on the Stock Control Plan of c. 1900 in its current location with ditches each side and the engine base and a storehouse to the north.¹⁸

The layout depicted on the 1910 3rd edition Ordnance Survey Map¹⁹ is at slight variance to this but this may reflect the accuracy of the individual

¹⁴ Volume II, 2.2

¹⁵ see Matrix 2011, gazetteer no. 33

¹⁶ Matrix 2011, gazetteer no. 17

¹⁷ Volume II, 2.3

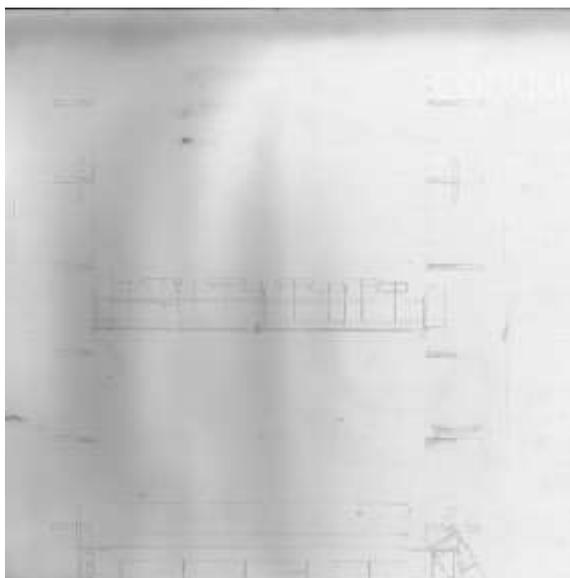
¹⁸ Volume II, 3.52

¹⁹ Volume II, 3.51

buildings surveyed. The general layout appears to be similar.

An aerial photograph of c. 1947 shows the complex clearly.²⁰ Pan House 2 has a pitched roof, hipped at either end at this time. The engine base can be seen located to the north.

The pan house was entirely re-built in the late 1960s as part of a plan to upgrade Pan and Stove House 2. This involved the automation of the pan system to allow the automatic removal and drying of salt thus reducing labour costs at the works. Plans show the implementation of a new pan, steel framework, machinery, and conveyor belts (described in detail below). The wooden framework of the pan house was also re-built at this time as shown by plans and cross-sections of this work (2.47).



2.47: Pan House 2, plan of automated mechanism inserted in 1960s

The pan house had entirely collapsed by the 1980s. The framework of the roof lay derelict within the pan itself as visible on aerial photographs dating to 1986-1990 (2.48, 2.51).

By 2009 the wooden structure of the pan house had almost entirely collapsed (2.49, 2.50). The roof was located within the pan as debris. The southern, northern and eastern sides of the pan house, survived but had partially collapsed.



2.48: c. 1986 aerial photograph, Pan House 2 is visible as collapsed remains, east facing



2.49: Pan House 2, collapsed remains c. 1990, east facing



2.50: Pan House 2 and Stove House 2, c. 1990, pan house visible as collapsed timbers

²⁰ Matrix 2011, fig. 11



2.51: c. 2000 Aerial Photograph, Pan House 2 has entirely collapsed, east facing

Remedial work in 2009 involved the clearance of the debris in the pan and removal of loose timbers from the front (eastern) side of the pan. In October-December 2012 further clearance of the southern and northern sides of the pan was undertaken in order to make the area safe for access and allow scaffolding to be erected to access the eastern side of Stove House 2.

Description

The following description is of Pan House 2 as it survived between 2009 and 2012. Where possible description based on the historic photos and plans will be incorporated.

Pan House 2 was a one-and-a-half storey hipped roof structure, constructed mainly in soft wood timber. The principal façade was orientated east and it abutted Stove House 2 to the west. South of the structure were the remains of the loading bay and link bridge with Stove House 5 (see BS055, BS056, BS057).

Exterior

The principal façade faced east. It survived as the partial remains of a wood and ferrous metal hipped roof structure that formerly extended over the front of the stove but had largely collapsed or been dismantled in 2009. Access to the stoves was covered with two open bays facing east (BS056, BS057, BS059, 2.52, 2.53). The remains of the structure were a single wooden post (5275) and two ferrous metal rails that formed a central purlin (east-west; 6657).



2.52: Pan House 2, in 2009, with link bridge to the rear, south facing



2.53: Pan House 2, in 2012, collapsed remains of the covered area at the front of the pan, west facing

Either side to the north and south were corner posts (5276, 5277), and mid posts (5278, 5279) that supported sloping principal rafters above (5280, 5281). Access was gained to the covered central bays via plank and baton doors on the southern and northern elevations. The northern of these had been entirely removed, the southern survived in a partially collapsed state (5282; 2.54, 2.55). Between the hipped roof structure covering the stoves and the hurdles at the side was a covered walkway on both northern and southern sides. This survived as a single post on the southern side (5283) and a single post with attached rails on the northern side (5284). Any covering had been entirely removed.



2.54: Pan House 2, in 2009, collapsed remains of the front of the pan, north facing



2.55: Pan House 2, in 2012, collapsed remains of the front of the pan, north facing

The southern side of the barricades was of stud-wall construction with horizontal planks throughout (BS061, 2.56, 2.57, 2.58, 2.59). The full-height vertical studs (5245, 5246, 5247, 5248, 5249, 5238, 6457) were supported on a sill-beam (5272) that rested on a hand-made red brick sill wall (6651). The hurdle walkway was supported on joists (5271) aligned north-south that in turn rested on an east-west rail at the southern side and rail (5261) and the stove house wall (6638) (see 2.60, 2.61). Few planks of the walkway survived but these were 2.5-3" thick (5236, 5243). The structure was almost entirely collapsed and appeared to have become worse since 2009. The

vertical studs had racked to the east and begun to collapse into the pan. Almost all the hurdle joists and rails had collapsed and the walkway survived predominantly as debris.



2.56: Pan House 2, in 2009, collapsed remains of the southern hurdles, west facing



2.57: Pan House 2, in 2009, collapsed remains of the southern hurdles, west facing



2.58: Pan House 2, collapsed remains of southern hurdles in 2012, west facing



2.59: Pan House 2, collapsed remains of the southern hurdles in 2012, north-east facing

The bank of the loading bay abutted the southern barricades, surviving to a height of c. 1.4m. It consisted of a black clinker-ash material (1059) and had been revetted by a series of horizontal planks (5159), in a dog-leg form that ran broadly east-west from the concrete wall of the loading bay (6671) to the eastern wall (6640) of Stove House 2.



2.60: Pan House 2, southern hurdle walkway in 2009, west facing



2.61: Pan House 2, southern hurdle walkway in 2009, north facing

The northern side of the barricades was of similar construction to the southern side (BS056, BS057, BS060, BS062; 2.62, 2.63, 2.64, 2.65). It was of stud-wall construction covered with horizontal planks. The full-height vertical studs (5253, 5256, 5257, 5262, 5263, 5264, 5265, 5266) were supported on a sill-beam (5268) that rested on a low, machine-pressed red brick sill wall (6650). The hurdle walkway was supported on joists aligned north-south (5270) that rested on an east-west rail (5267) attached to the vertical studs and a rail and stud framework (5273) adjacent to the stove house wall. The hurdle walkway survived as a series of 2-2.5" thick planks aligned east-west (5239, 5244). Approximately 40% of the walkway survived in situ, but was in poor condition, either decayed or collapsed. On the northern face was a narrow doorway to the hurdle walkway, approached by a series of three steps (5269).



2.62: Pan House 2, northern hurdles, south-west facing



2.63: Pan House 2, northern hurdles, south-west facing



2.64: Pan House 2, northern barricade, south facing

The roof of the pan house was originally hipped on the eastern side. It was gabled on the western side, as indicated by construction plans, but was not tied in to the roof system of Stove House 2. The western gable appears to have been covered with horizontal planks. The construction plans show that the roof was supported on a series of four trusses. These consisted of principal rafters with a simple tie-beam constructed in soft-wood. These are tied together by three ferrous metal-

brace rods from the apex and the base of each principal rafter, tied together centrally. This is an identical design to Pan House 3. The roof cover was originally of corrugated cement asbestos.



2.65: Pan House 2, northern barricade, south-west facing

Interior

The stove was constructed of machine-pressed red brick in English Garden Wall bond. The southern (6638) and northern (6639) walls both survived *in situ*. They were both braced by two brick piers (southern 6648, 6649; northern 6646, 6647) at either end. The eastern wall (6675; BS056, BS059), where the stove would have been fired, had entirely collapsed and was a mound of brick rubble. Within the brick rubble was the remnants of ceramic and ferrous metal mounts for the oil-firing system, two were recovered (5285). The stove was designed to be fired by oil as part of the 1960/ 1970s redesign. Oil pipes were located on the floor (5242) that probably survived from the original mechanism. The oil would have come from a series of tanks, the bases of which were located to the east (1057). The pipes probably ran along the front (southern side) of the Brine Tank. The interior plan (BS056), would have originally consisted of four east-west flues, with a dead-draft at either side (as seen in construction plans). These had almost entirely collapsed and survived as remnants only (6642).

The pan (6652) was of ferrous metal, orientated east-west and survives in poor condition (BS057; 2.66, 2.67, 2.68, 2.69). It was 12.0m (east-west) x 7.20m (north-south), in size. The sides of the pan were of ferrous metal, but whilst the southern and northern sides were vertical, the eastern and

western side so the pan were sloped. The floor of the pan was made of ferrous metal plates, riveted together.



2.66: Pan House 2, Pan during cleaning in 2009, north-west facing



2.69: Pan House 2, pan at western end, south facing



2.67: Pan House 2, Pan after cleaning in 2009, west facing



2.68: Pan House 2, pan at eastern end, north-east facing



2.70: Pan House 2, detail of rail of automated skimming mechanism

It was either an entirely new pan replaced in the 1970s or had been radically altered. This was to allow an automated salt-skimming mechanism (BS057, BS063, BS064, BS075, 2.70, 2.71). The skimming mechanism consisted of two metal rails (north 6653; south 6654) mounted on stanchions (north 6659, 6660, 6661, 6662, 6663, 6664; south 6665, 6666, 6667, 6668, 6669, 6670) either side of the pan. A further three north-south cross-rail (6655, 6656, 6658) ran between the rails either side. A moveable cross-rail also connected the rails connected to which were a series of ferrous metal paddles designed to skim the salt from the surface of the brine (5286).



2.71: Pan House 2, detail of rail of automated skimming mechanism, northern side, west facing

The pan extended into Stove House 2 at its western end, where the lower half of the stove house wall had been removed to insert the automated salt-skimming mechanism. The sloping end passed over the top of a conveyor belt (6676; see below, Stove House 2) where the salt skimmed from Pan 2 collected and was then automatically passed to Stove House 2 for drying. This is described below (Section 5.2).

Machine Bases

To the north of Pan House 2 was a series of brick and skimmed concrete machine bases (BS057, BS060; 2.72, 2.73). An overall larger base (6643), 5.10m (east-west) x 2.75m (north-south), was built in machine pressed red brick in English Garden Wall bond. Two cut-off tying down bolts were located along its northern side.



2.72: Pan House 2, machine base, east facing



2.73: Pan House 2, machine base, south-west facing

On top of this was a smaller, rectangular machine base (6644) of skimmed concrete with five tying down bolts. A 45° slope was located at the northern end. In the north-west corner was a small square machine base (6645), with four tying down bolts. The complex of machine bases appears to have been the location for small horizontal steam engine. The main machine was housed on the rectangular base, with a small fly wheel to the north.

Phased Interpretation

Phase 5: Pan House 2 was originally built in c. 1895. It was almost certainly located in the current location but it is debatable to what extent the original stove or pan house survives. Some remnants of the very base of the stove may date to this time. Little else of the structure can be seen as original. The roof of this structure is shown as hipped on both the eastern and western sides on the aerial photograph of c. 1947.

Phase 7b: In the 1970s the stove and pan house was radically altered. It is likely that the stove was either entirely replaced or significantly altered in order to run on oil. This involved the replacement of the interior flues (possibly from 6 flues as seen in Stove 3, to 4 as seen here). The eastern façade was replaced and oil fired mechanism inserted.

The pan was also radically redesigned and the automated skimming mechanism dates to this period. Some areas of the pan, the south-east corner in particular appears to retain the original form of the standard pan and this may suggest that this process was not total and involved the

patchwork replacement of the earlier pan. The design may have been Henry Thompson's own but was not unique as similar designs are referenced by Tom Lightfoot at the Vacuum Plant, Winsford.²¹ The pan house structure appears to have been entirely rebuilt at this stage. Construction plans for the pan suggests that the earlier structure was entirely dismantled and rebuilt.

Phase 8: The pan had almost entirely collapsed by the 1980s, reflecting the very poor design of the 1970s pan house and the fact that it was probably not used after the late 1970s.

2.3 STOVE HOUSE 2

Historical Background

Stove House 2 is located to the west of Pan House 2. The area was originally part of the complex of cottages depicted on the 1846 Tithe Map of Marston.²²

Stove House 2 was built in its current location contemporary with Pan House 2 in 1898-1900 (Phase 5, see above). It partially follows the footprint of the earlier row of stables and it may be that it incorporates the foundations or part of the fabric into the later building on the northern and western elevations. The southern end was tied into the earlier Stove House 1 (see above) to form a continuous L-shaped block.

The stove house was depicted on the c. 1900 Stock Control Plan²³ with a mill centrally placed where the louver is now located in the roof. Henry Thompson²⁴ has stated that this was the original location of Crushing Mill 1 from Stove House 4 (see Section 2.9). The power would have been provided by the steam engine housed externally and to the north of Pan House 2 on the concrete base (see above, Section 2.2). The original layout of the flues of the stove house is unclear.

The stove house otherwise remained unchanged until the 1960s when an automated system was introduced (see above, Section 2.2). Plans suggest

the ground floor was radically altered. The flues were entirely replaced by a large flue system with electric powered fans. A system of conveyor belts brought salt from the open pan of Pan House 2 and these passed around the room. The electric powered fans drew air over the conveyor belts rapidly drying the salt. This then passed automatically to the warehouse level above (see below, Section 5.2). The stove house remains largely complete in its final form (BS065, BS066, BS067; 2.74, 2.75).



2.74: Stove House 2, 1990s, south-east facing



2.75: Stove House 2, late 1990s, south-east facing

Description

Stove House 2 was a two storey warehouse building, of sub-rectangular plan, orientated north-south. It had originally been built as an extension to Stove House 1 (see above, Section 2.1) and the southern end of the plan had been inserted into the earlier Stove House 1, to form an overall L-shaped pan between the two stove houses. It was constructed in a combination of two types of machine pressed red-brick on the ground floor and timber-framed soft-wood on the first floor. The

²¹ Fielding 2000, 39, fig. 61

²² Volume II, 2.2

²³ Volume II, 3.52

²⁴ *pers comm* with Andrew Fielding, discussed in 2009 blog of restoration work

roof was pitched with two louver windows in the apex.

Exterior

Pan House 2 (see above, Section 2.2) was situated perpendicular to Stove House 2 and abutted the eastern elevation. The east façade on the lower ground floor had been altered to allow the insertion of the automatic salt-skimming mechanism associated with Pan House 2 (BS075; 2.76). This involved a very wide, open, central bay where a large portion of the brick wall of the ground floor had been removed. The original hand-made red brick in English Garden Wall bond survived at the northern end for c. 8m (6568; 2.77). This had been replaced at the southern end by machine pressed yellow brick in English Garden Wall bond for a further 3.50m (6674). On the ground floor at the northern end was a low doorway (6570) approached by a set of three brick steps (6569).



2.76: Stove House 2, east elevation, facing north-west



2.77: Stove House 2, east elevation, facing west

The first floor was constructed of a soft wood, timber-framed, stud wall, covered in horizontal

planks (6572). The vertical studs were attached to a sill-beam below, with a wall plate above. The majority of the horizontal planks had decayed or been removed and were now covered only with remnant felt material. An opening visible in the elevation (6573) would have allowed access to an external walkway. A further opening (6593) would have allowed light to the interior.

At the southern end, the former eastern wall of Stove House 1 (6437, see above, Section 2.1) had been replaced by machine-pressed yellow brick in English Garden Wall bond, orientated at an angle (SSW-NNE). All the walls described above had been built off an original foundation wall (6640, 6641) of machine-pressed red brick in English Garden Wall bond.

The southern end of the elevation had the fragmentary remains of Stove House 1, eastern gable end (BS070; 6595; see above, Section 2.1). These had two wide doors that led from the walkway (5145, now dismantled, see below), that had collapsed and been removed. Only a few remnants of the stud wall, and the principal rafters (6550, 6554) survived, with the pitched roof. The entire structure had slumped. The stud wall in this location had decayed and been recently replaced (possibly 2009) with a very simple soft wood stud wall (6598). The southern elevation was subsumed in the remains of Stove House 1 (discussed above).

The northern gable was of hand-made red brick in English Garden Wall bond (6564) construction on the ground floor (BS076; 2.78). This had been reinforced on the interior face with concrete breeze blocks laid very poorly in Stretcher bond (6600). The remainder of the gable was taken up in soft wood, timber-framed, stud-wall construction (6565) and covered in horizontal boards. In turn these had been felted over to provide waterproofing. On the first floor a wide central doorway (6566) opened to the north with a pair of plank and baton doors. This gave direct access from the warehouse onto the canal for loading.

The western elevation was again of brick construction on the ground floor (BS074; 2.79, 2.80). Two clear phases of construction were visible in the wall. The northern side was

constructed in earlier hand-made red brick in English Garden Wall bond (6556), whilst the western side was constructed in red/ yellow machine-pressed brick (6673). The first floor was again constructed in soft wood, timber-framed stud wall (6557). Two double doorways opened to the north (6558, 6559). Only one (6559) had remaining plank and baton double doors. These would have exited onto a former walkway that ran from Stove House 2 towards the canal adjacent to Pan House 1.



2.78: Stove House 2, east elevation from the canal, west facing



2.79: Stove House 2, western elevation, south-east facing



2.80: Stove House 2, western elevation, east facing

The roof was pitched in corrugated cement asbestos (6560, 6567), and two/ three louvers (see below, 6561, 6562, 6563) were positioned along the ridge line towards the northern end (BS067; 2.81, 2.82).



2.81: Stove House 2, roof with detail of louvers in ridge line, north-west facing



2.82: Stove House 2, western pitch of roof, north-east facing

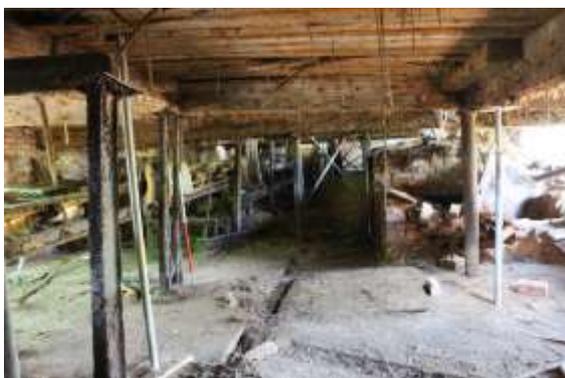
Interior (Flue Level)

The lower ground floor was originally an open area within which were a series of flues (for example see description of Stove House 1). It had been

radically altered in the 1960/ 1970s to accommodate an automated drying system associated with the skimming system described above (Pan House 2, Section 2.2; BS065).

The floor was of skimmed concrete, in slabs across the floor with breaks and gullies between (6677). This was of later construction replacing an earlier floor. Orientated north-south at the northern end of the ground floor in the centre was a large upstanding flue (6601) constructed of machine-pressed brick in the Stretcher bond (2.83). This turned at the southern end and hot air was fed directly from the stove in Pan House 2, via one large flue (6679) that had partially collapsed. It was 1.60m wide, 1.35m tall and c. 15.0m long. A damper plate and handle (6678) controlled the flow of hot gases into the flue. The flue continued to the north where it originally followed the side of the room (2.84) around to the west and then south (6680, 6681) before passing out through a separate flue (6431) to Chimney 2 (6430). A further damper plate and handle (6432) controlled flow at this end. The remains of the western element of the flue system were collapsed and visible as collapsed brickwork and the degraded remains of a series of ferrous metal plates (5160, 5161) that covered the top of the flue.

In the north-eastern corner was a large electric driven fan (6682; BS149; 2.85). This drove a heat extractor system, with air passing through pipework (now removed) into the north-south flue and from there onto a system of conveyor belts associated with a drying mechanism that covered the ground floor (discussed in detail below; Section 5.2).



2.83: Stove House 2, flue level, north facing



2.84: Stove House 2, flue level, north facing



2.85: Stove House 2, electric driven fan in north-east corner, west facing

Interior (Warehouse Level)

The floor of the warehouse was supported on a series of six east-west transverse beams (6584-6589) at the northern end. At the southern end three beams (6534, 6602, 6603) survived from the earlier Stove House 1 (see above) and ran perpendicular (north-south). They supported the 2.5-3" floorboards of the warehouse (6606, 6607). As seen previously these floorboards, had a ferrous metal fillet between each board. Located throughout the floor boards were a series of nine c. 1m square salt hatches (north 6610, 6612, 6614, 6615, 6616, 6618; south and mentioned above with reference to Stove House 1, 6619, 6620, 6621). These were roughly equidistant between each other. Trimmers on the underside of the

floorboards supported the edge of these salt hatches. A large opening (6608) at the northern end of the warehouse floor allowed the vertical conveyor belt to pass through to the first floor (see above). This had a single trimmer supporting it that had fallen and lay on the floor. An opening (6613) on the eastern side of the floor may denote where belts to drive the crushing machine formerly passed through the floor surface. Throughout the remainder of the floor, decay and remediation work in 2009 had resulted in the loss of floor boards (see 2.86, 2.87, 2.88).



2.86: Stove House 2, warehouse floor, eastern side, north facing

length of the roof attached to each king post. The underside of the pitched roof was covered in vertical soft wood boards (6575, 6591), the exterior was covered in corrugated cement asbestos sheets (6560, 6567).

At the southern end where Stove House 2 was incorporated into Stove House 1, the earlier roof structure has been adapted (see above). This involved the removal of large sections of the original trusses of Stove House 1 (trusses 6552, 6553), which had subsequently collapsed.



2.88: Stove House 2, warehouse floor, western side, north facing



2.87: Stove House 2, warehouse floor, southern end, north-west facing

The first floor warehouse was open to the roof level (BS066; 2.89, 2.90, 2.91). The roof structure consisted of a series of six wooden aisled trusses (6577-6582). These had aisle posts, supporting two principal rafters with aisle ties, above was a tie-beam and king post. On either side were a series of four staggered purlins (6576, 6590), each member one bay long, attached by clasp joints to the principal rafters. The ridge beam (6583) ran the



2.89: Stove House 2, warehouse level, south facing



2.90: Stove House 2, warehouse level, c. 1990, north facing



2.92: Stove House 2, warehouse level, c. 1990, north-west facing



2.91: Stove House 2, warehouse level, c. 1990, south-east facing



2.93: Stove House 2, louver, c. 1900, south-west facing

At the northern end of Stove House 2 were two louvers in the apex of the roof (BS067, BS069, BS071; 2.92, 2.93, 2.94). The large (northern, 6561) of the two stretched over two bays of the roof trusses. It had two louver windows on each (western and eastern) side and a simple pitched corrugated cement asbestos roof. The structure was constructed on a soft wood frame, with planks on the sides and underside of the roof. Within the louver itself, was a much smaller louver (6562) in the apex of the roof that acted as a vent. The second (southern, 6563) louver was smaller and covered only a single bay. It was of similar design to the first louver but was smaller and lacked the subsidiary louver vent.



2.94: Stove House 2, louver in 2012, north facing

The northern louver formally housed the crushing machine (now located in Stove House 4, see history above). No trace of the structural support was visible in the floorboards. Running from the southern side of the northern louver and through the southern louver, mounted on the aisle trusses was a ferrous metal line shaft (6687), presumably also using the same power source as the crushing machine (the steam engine formerly housed on the machine base). It is unclear if this was part of earlier machinery or was used as overhead power source for belt driven machinery.

Access passed to a series of walkways (now removed) that appeared to have run around the western, northern and eastern (at the northern end only) exterior. The remains of the transverse beams appear to have been cut when this structure was removed. The remains of a double doorway to the north (6566, see above; 2.95) and a double doorway to the west (6559, see above; 2.96) remained whilst a further opening to the west (6558, see above), and east (6573 existed. Housed within the roof space were the remains of a wooden slide or trough (5287). Although this could be considered a moveable item it appears to be from its original location and would have been used to pass salt from the warehouse directly onto barges located on the canal via the walkway and doorway 6566.

On the western interior elevation attached to the wall were a series of three wooden fuse boxes. The southern (6633) had mostly collapsed, but one of the northern pair (6635; 2.97) survived *in situ*. The other was collapsed on the floor (5148).



2.95: Stove House 2, double doorway, 6566, north facing



2.96: Stove House 2, double doorway, 6559, west facing



2.97: Stove House 2, electric fuse box, 6635, north-west facing

Housed within the building were the remains of a portable conveyor belt (5149, 2.98). This was a machine on two inflatable tyres with a metal frame, and a conveyor belt. The conveyor belt fabric was also found on the floor (5150, 5151). A small portable hopper also existed (5152, Plate 6.10.35). These appear to have allowed salt to be removed from the vertical conveyor belt during

the packing process. Images of these exist from the 1990s (see 2.99).



2.98: Stove House 2, portable conveyor belt remains 5149, south facing



2.99: Stove House 2, c. 1990 with portable elevator surviving in situ, north facing

Phased Interpretation

Phase 5: The Stove House was part of the first expansion of the Thompson's works around c.

1900. Originally Stove House 2 probably consisted of a simple coal fired stove and pan (Pan House 2). The pan flues are likely to have been of simple north-south/ east-west design similar to those seen in Stove House 3 and 4. The perpendicular arrangement of pan and stove house is much more similar to historical accounts of design.²⁵ The location of Chimney 2 strongly suggests that this was built in Phase 5 to draw the flow of hot-air through the flues on the ground floor. Stove House 2 was inserted directly into the design of Stove House 1. This appears to have created inherent structural weakness in the latter building's roof. It did create a large open warehouse space that passed directly from Stove House 3, through Stove House 1 to Stove House 2 and the canal. It is highly probable that a walkway was located along the western side of Stove House 2 adjacent to Pan House 1.

Originally the large crushing machine located in Stove House 4 was located in Stove House 2, in the atrium space created by the louver at the northern end of the warehouse level. The crushing machine was originally steam powered, with the steam engine located on the machine base east of Stove House 2. The steam engine was powered by steam pipes that ran from the boiler in the engine house/ brine tank, some of which are still visible. The belts from the steam engine passed into the upper floor via openings in the eastern elevation, presumably turning the large fly belts still visible on the crushing machine (see below, Stove House 4, Section 2.9). It is apparent that further machinery was also run off the steam engines as a horizontal line-shaft runs centrally within Stove House 2. These were possibly predecessors to the cutting machines located in the Packing Area (see below, Section 2.4).

Phase 7b: The design of Stove House 2 was radically altered in common with Pan House 2. This involved the removal of the previous flue system on the ground floor and the removal of the majority of the eastern elevation on the ground floor to accommodate a new automated salt processing system (see below, Section 5.2). The

²⁵ e.g. Fielding 2000, 10-11

use of conveyor belts and hot air driven flue systems is highly reminiscent of processing designs used at the British Salt Works, Middlewich to the present days. The British Salt Works was opened in 1967 as a state of the art works and it is possible that the redesign of Stove House 2 was directly influenced or stimulated by this development and the potential economic threat. The automated processing unit was certainly working in the early 1970s as oral historical accounts have been given of it being used.

Phase 8: The new design appears to have been short-lived and had ceased by the mid-1980s as Pan House 2 had collapsed by this point. This appears to have been part of the process of the gradual decline of the northern part of the site visible in the demolition of Pan House 1 and the dereliction of Stove House 1.

2.4 THE PACKING AREA, LOADING BAY AND LINK BRIDGE

Historical Background

The area of the Loading Bay, Packing Area and Link Bridge were the original location of the Red Lion Hotel complex as depicted on the 1846 Marston Tithe Map.²⁶

When the hotel was demolished between 1894 and 1898 the use of the area was changed to two (of four) large fishery pans. These had the same basic plan as other pan houses but lacked the roof and external structure. These are first depicted on the stock control plan of c. 1900²⁷ and later on the 3rd edition Ordnance Survey plan of 1910.²⁸ The remains of the eastern fishery pan were uncovered in Trench 2 of the evaluation.²⁹

The Packing Area and Loading Bay date from between 1956 to 1965. Stove House 4 was completed in 1956 and it is likely that the packing area was built at this time to link the new Stove House 4 to the older complex of Stove House 1 and 2. The purpose built frame of a doorway in the northern elevation of Stove House 4 would appear to suggest that this was a deliberate feature. The

Link Bridge must have been added in 1965 to correspond with the construction of Stove House 5 and link the complex together. The complex is first depicted on the 1970 Ordnance Survey map as a uniform block.³⁰

The complex was intact in the early 1990s (see 2.100, 2.101, 2.102, 2.103). The complex in common with many wooden elements of the Lion Salt Works began to decay rapidly once continuous maintenance ceased in 1986. This resulted in the partial collapse of the walkway in the 1990s and elements of the loading bay roof collapsing.

During the 2009 enabling works the walkway was dismantled and stored in the white building. The loading bay was dismantled up to the line of Stove House 4, with the exception of the large vertical timbers. Finally the sloping roof of the packing area was dismantled.



2.100: Loading bay and walkway, c. 1986, north facing



2.101: Loading bay, south facing

²⁶ Volume II, 2.2

²⁷ Volume II, 3.52

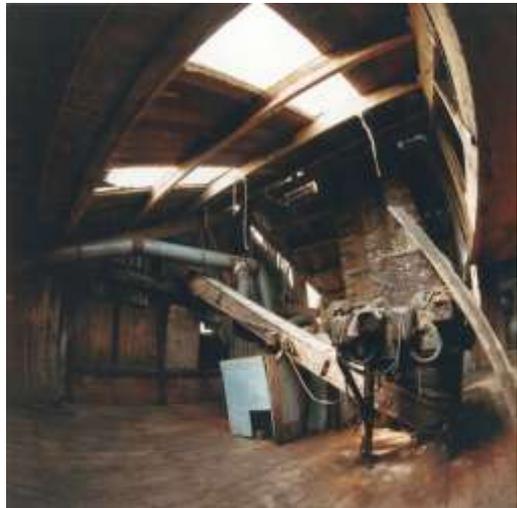
²⁸ Volume II, 3.51

²⁹ OAN 2011, see Volume IV, Appendix I

³⁰ Matrix 2011, fig. 13



2.102: Packing area, interior, c. 1990, west facing



2.103: Packing area, interior, c. 1990, south-west facing

Description

The loading bay, walkway and packing area consists of a series of wooden structures linking Stove House 5, Stove House 4, Stove House 2 and Stove House 1 (The Link Block). They were built in the gap between these buildings around Chimney 2. These structures were supported on a series of wooden posts and the majority of the working area was at first floor level. The whole area survives in a varying degree of originality, completion and preservation.

The Loading Bay

The whole area was built over three levels. The lowest ground level consisted of the overall ground floor level on the site, on the eastern side adjacent to Stove House 5. A ramp ran south-

north, with a concrete and brick retaining wall (6672) on its eastern side (BS094, BS095, BS096, BS097, BS098, BS099; 2.104, 2.105). This was in-filled with a mixture of clinker ash (1059) and retained to the north by a wooden revetment wall (see description above, Pan House 2). This created an upper ground level that was used for the loading of petrol-driven lorries.



2.104: Loading bay, south facing



2.105: Loading bay, ramp in foreground, north-east facing

The loading bay itself had two parts, the eastern was open to allow lorries to park directly adjacent to a wooden platform (5231) on the western side (2.106, 2.107). The platform was supported on a series of large wooden posts (6439, 6458, 5229, 6441, 5125, 6452, 6453, 5124, 5122) set about 1.5-2.0m apart and supporting a series of beams (eg. 6465, 5123). Running adjacent to Stove House 4 was the continuation of the platform (5231) accessed by a set of brick and wooden steps (5234, 5235). Set on the platform was a large electric extractor fan for the cutting and crushing machines in the Packing Area (BS139-143; 2.108).

Access from Stove House 4 to the Loading Bay was via a doorway with a sloped floor (see below, Stove House 4, Section 2.9, 2.109, 2.110). The whole of the Loading Bay was covered by a gently sloping roof supported on a series of six reused circular telegraph poles (6459, 6460, 6461, 6462, 6688, 6689, 2.111, 2.112).



2.106: Loading bay, platform on western side, north facing



2.107: Loading bay, wooden platform, south-west facing



2.108: Loading bay, wooden platform, north-east facing



2.109: Loading bay and Stove House 4, doorway access, west facing



2.110: Loading bay and Stove House 4, doorway access, south-west facing



2.111: Loading bay, roof, north-west facing



2.112: Loading bay, roof, west facing



2.114: Walkway, c. 1990, internal, east facing

The walkway

The walkway ran east-west from the warehouse levels of Stove House 2 to Stove House 5 (BS061, BS095; 2.113, 2.114, 2.115, 2.116, 2.117, 2.118). It was supported on a series of wooden posts, either of circular reused telegraph poles (e.g. 6450), or large square section (6452, 6454, 6455, 6456, 6457, 5122, 5130, 5131), one and two-storey posts. Rails ran between the posts to provide a frame (e.g. 5274) and WNW-ENE running joists (e.g. 6467) supported the floor boards of the walkway. The north-south floor boards were 2.5" thick (e.g. 6469, 6473). A wooden structure covered the walkway above (5232) and surrounded on the southern and northern sides by vertical planks (see 2.220). Towards the loading bay it was open on the side. The roof was covered in corrugated iron (2.119).



2.115: Walkway entering Stove House 5, south facing



2.113: Walkway, c. 1990, internal, west facing



2.116: Walkway from the loading bay, north facing



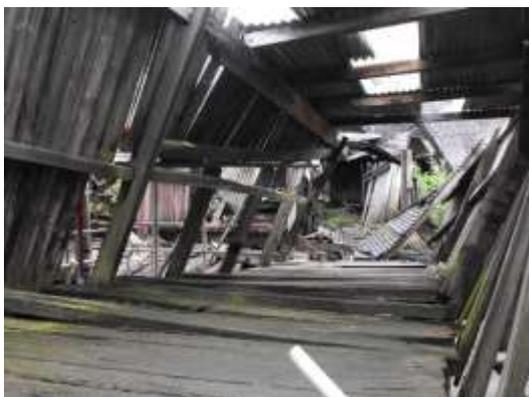
2.117: Walkway, looking towards Stove House 5, east facing



2.120: Walkway, adjacent to Pan House 2, west facing



2.118: Walkway entering Stove House 5, north-east facing



2.119: Walkway, viewed from Stove House 5, collapsed internally, west facing



2.121: Loading Bay and Packing Area, west facing

The ground floor was functional support for the Packing Area above, built around Chimney 2 (see description below). On the western side of Chimney 2 a series of taller posts (e.g. 5227, 6636,

6637, 6484) supported longitudinal and transverse beams (6429, 6474, 2.122). These supported north-south floor boards (5228) that were removed in 2009 as part of the enabling works (2.123). On the eastern side it consisted of a series of square or rectangular cross-section posts (6440, 6442, 6443, 6444, 6445, 6446, 6447, 6449, 6451) supporting east-west transverse beams (6470, 6471) and a series of seven, large, north-south joists (6466). These in turn supported east-west floor boards of the Packing Area (6468). None of the sides of the packing area on the ground floor was enclosed except where it abutted an adjacent building (SH4, SH3, SH2; see 2.124, 2.125, 2.126).



2.122: Packing Area, beam 6429, after removal of floor, south facing



2.123: Packing Area, floor removed in 2009, south-west facing



2.124: Packing Area, supports east of Chimney 2, north-east facing



2.125: Packing Area, joists east of Chimney 2, including Stove House 4 wall, south facing



2.126: Packing Area, joists east of Chimney 2, north facing

The first floor was largely open (with the exception of Chimney 2; 2.127, 2.128). The first floor plan was enlarged where it extended into the former footprint of SH1 in the north-west corner. The elevations were built of simple wooden stud framework that had been boarded out with vertical tongue and groove plywood (western 6628, 6631, northern, 6495, southern 6489, eastern 6490). The eastern elevation had two sliding doors (6491, 6492) to access the Loading Bay (2.129).



2.127: Packing Area, first floor, west facing



2.128: Packing Area, around Chimney 2, west facing



2.129: Packing Area from Loading Bay, including sliding doors 6491, 6492

The roof of the Packing Area was hipped on the northern side. It had two asymmetrical trusses (6477, 2.130; 6479, 2.131), aligned east-west, of King-Post design, with uneven raking struts (two on the eastern side and one on the western). These were supported on a series of posts (6483, 6484, 6485) sat on top of the transverse beams below, with the exception of the south-west corner that had seen the original long post (5227)

replaced by a small piece of wood (6478). A set of five purlins were located on each of the three sides of the roof with a single member to each purlin (6480, 6481, 6482). The roof was covered in corrugated cement asbestos (6486, 6487, 6488).



2.130: Packing Area, truss 6477, adjacent to Stove House 4, south-west facing



2.131: Packing Area, truss 6479, next to Chimney 2, south-east facing

A crushing machine and two cutting machines were located in the centre of the floor surface. These are described in detail in Section 5.1 below.

Phased Interpretation

Phase 7a: The Packing Area appears to have been originally constructed contemporary with the completion of Stove House 4 in c. 1956. There is an entrance doorway in the northern elevation of the gable steelwork that suggests a walkway was always planned between Stove House 2 and Stove House 4. The whole of the Packing Area was constructed at this time. Stove House 4 contains an entrance to the warehouse level in the north-east corner. This appears on the plans of 1956, and the set of steps were part of the original 1956 design. It may be that the Loading Bay platform was built before, contemporary or after 1965.

Phase 7b: The walkway was designed to connect Stove House 2 to Stove House 5 directly, and was therefore contemporary with the latter and built by 1965.

The platform may have been in place, but open prior to 1965 (possibly as part of Phase 7a in 1956). The subsequent covering of the roof therefore occurred at a later date. Some hint of the date may be given by the use of large circular former telegraph poles in the construction of the loading bay canopy roof and the walkway, suggesting they may be contemporary structures and the entire complex was completed by 1965.

2.5 CHIMNEYS 1 AND 2

Historical Background

Chimney 1 is the earliest chimney located on site. It is located between Stove House 1 and 3 adjacent to Ollershaw Lane. It was constructed by 1900, but is not depicted on the 2nd edition Ordnance Survey map of 1898.³¹ It seems unlikely that the chimney was constructed contemporary with Pan and Stove House 1 in c. 1894. It is first depicted on the stock control plan of c. 1900³² and later on the 3rd edition Ordnance Survey map of 1910.³³

It is visible on an image of the works dating to the 1920s (2.132). The aerial photograph of c. 1947³⁴ reveals its height comparatively to Chimney 2 and 3. The shadow of each chimney suggests that Chimney 1 was taller than Chimney 2, but marginally smaller than Chimney 3.



2.132: Chimney 1 and 2, visible in a photograph dated to c. 1920, south facing

³¹ Volume I, 5.5

³² Volume II, 3.52

³³ Volume II, 3.51

³⁴ Matrix 2011, fig. 11

A photographs show its original height in the 1960s, in comparison with the other chimneys on site (2.133). In c. 1980 it was reduced in height, to the level of the eaves of the adjacent Stove House 3 when it became unsafe due to the proximity of Ollershaw Lane (2.134).

Chimney 2 was believed to have been constructed on the site of the cellar of the Red Lion Hotel.³⁵ Detailed examination of the mapping suggests that this is incorrect as it lies north of the footprint of the Red Lion Hotel. The chronology of construction of Chimney 2 is not clear. It is not depicted on the 2nd or 3rd edition Ordnance Survey map³⁶ or the stock control plan.³⁷ A photograph uncertainly dated to c. 1920, taken from Ollershaw Lane shows all three Chimneys on site and supports the early 20th century date for Chimney 2 (2.132).



2.133: Chimneys 1, 2 and 3 in an overall photograph of the site, taken in the 1960s



2.134: Chimney 1, in 1980s, after reduction in height, south-east facing

³⁵ e.g. DIA 2005, Appendix 2, 38

³⁶ Volume I, 5.5; Volume II, 3.51

³⁷ Volume II, 3.52

The first undoubted proof comes from the c. 1947 aerial photograph that shows the chimney.³⁸ It appears to relate to Stove House 1 or 2 but it cannot certainly be seen to relate to either and may be associated with the four fishery salt pans.

Henry Lloyd Thompson says it started to lean whilst it was being built, hence the buttress were constructed on the east side. This cannot be certainly attested but may be the case. An image taken from north of the Ollershaw Lane canal bridge shows all three chimneys in the 1960s and reveals that Chimney 2 was smaller than Chimney 1 (2.133).



2.135: Chimney 2, taken in early 1990s during repair of upper portion of Chimney, north-west facing



2.136: Chimney 2, with original height visible during 1990s repair, north facing

Remediation work was undertaken in 1991 that saw the top three foot of the chimney removed, re-pointing and the capping of the chimney (2.135, 2.136).

Description

Two chimneys were located in the historic core designed to draw exhaust fumes from the stoves through the stove houses.

Chimney 1

Chimney 1 (6509) was located adjacent to Ollershaw Lane, in the gap between the curved southwest wall of Stove House 1 and the curved northwest wall of Stove House 3 (BS053, BS070; 2.137, 2.138). It was a roughly square chimney, was 2.0m x 2.0m in size and survived to a height of 4.80m. It had been drastically reduced in height during the 1980s. It was constructed in machine pressed red brick in English Garden Wall bond. A string course ran around the chimney, c. 2.2m above ground level. A ferrous metal plate ran between brick courses below this with an attached plate set within each of the four corners. The western elevation had partially collapsed and a large hole was now present in the side of the elevation. The northern and southern elevations were plain. The eastern elevation had a semi-circular arched opening.

The earliest excavated flue evidence (see Volume IV) suggests it ran from Stove House 3 and Stove House 1. This was controlled by a damper plate and cables (see Stove House 1, Section 2.1) that cut off flow from either Stove House 1 or Stove House 3 depending on which pan was in operation.



2.137: Chimney 1, in 2009, north-east facing

³⁸ Matrix 2011, fig. 11



2.138: Chimney 1 in 2012, west facing

This was eventually replaced by flue (6510) that ran from the northern side of Stove House 3, into the eastern side of Chimney 1. It was constructed in poorly made machine-pressed red brick in English bond with ferrous metal plates on top but had almost entirely collapsed.

Chimney 2

Chimney 2 (6430) was located between Stove House 2, 3 and 4 (BS100, BS101, BS102, BS103; 2.139, 2.140, 2.141, 2.142, 2.143, 2.144, 2.145). It was a roughly square chimney, constructed in machine pressed red brick in English Garden Wall bond. It was 1.75m x 1.75m in size and survived to a height of c. 14.50m. Approximately c. 3.0m had been taken down during the early 1990s and rebuilt. This did not include the final three feet (c. 1.0m) which was not rebuilt. It is probable that a series of six ferrous metal bands were added at this time. One band (5134) has fallen/ been removed and was located adjacent to the chimney in 2012.

A buttress of stepped brick was located on the southern side of the chimney. This was 1.75m wide, extended south for 1.0m and was c. 1.5m high. An over-ground flue (6399) extended from Stove House 4 to Chimney 2. This was built on

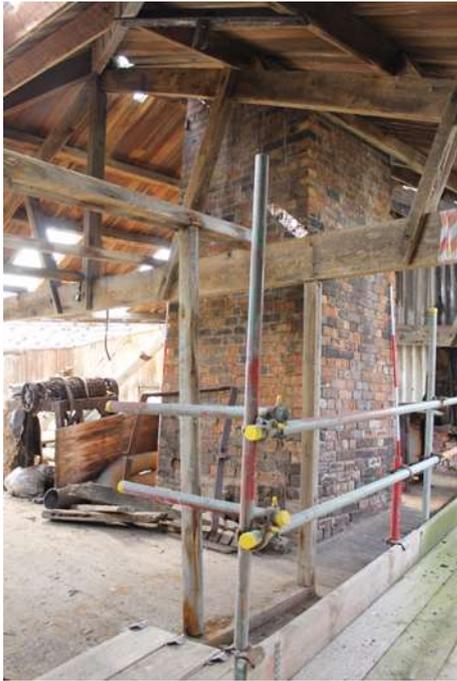
ferrous metal I-beams, with machine-pressed brick in the Stretcher bond. The top was capped with ferrous metal plates. A damper plate controlled the flow of hot gases from Stove House 4 into the chimney. A pulley mount with surviving rope is mounted above the plate.



2.139: Chimney 2, in 2012, east facing



2.140: Chimney 2, in 2012, south facing



2.141: Chimney 2, in Packing Area, south-east facing

on this side. The remains of a collapsed machine pressed red brick flue (6431) extended to the north into Stove House 2. This originally ran beneath the southern wall of Stove House 2 (see above). It connected into the flue runs put in place when the automated skimming mechanism was built (see Section 5.2).



2.143: Chimney 2, including flue 6399, west facing



2.142: Chimney 2, in Packing Area, south-west facing



2.144: Chimney 2, note damper plate and arm 6432, south-east facing

The eastern and western sides of the chimney were plain. The excavated evidence from Test Pit 29 (see Volume III) revealed the foundations of the chimney to be corbelled at a depth of 22.20m AOD. The northern side of the chimney had a semi-circular arched opening for the flue. A ferrous metal damper plate and arm (6432) were attached

Phased Interpretation

Phase 5: Chronologically, it would actually appear that both chimneys post-dated c. 1900 after the demolition of the Red Lion Hotel. The coal yard to the former Red Lion Hotel was adopted for the footprint of Stove House 1 suggesting it was one of the earliest buildings on site dating to 1894-1900,

it would need to have been served by a Chimney. Chimney 1 would have been located in the curved entrance, and would appear to post-date the demolition of the hotel. In principal Chimney 2 was built contemporary with the construction of Stove House 1. It would appear to be the most obvious location for a chimney for the earliest stove house, but does not appear on contemporary maps. It would have been built very close to the Red Lion Hotel, but not directly over it and may therefore be more closely dated to Phase 5. This leads to the conclusion that the earliest stove house used a different chimney, the most obvious candidate being the now demolished Chimney 4 (see archaeological excavations, Volume III). It would appear that both chimneys were constructed at a slightly later date in c. 1900, contemporary with the construction of Stove Houses 2 and 3.

Chimney 1 acted as the chimney for both Stove House 1 and 3. Flue 6146 in Stove House 3 turned at the northwest corner and met the end-flue 6141 before joining the flues of Stove House 1. The southern end-flue of Stove House 1 fed directly into Chimney 1, under the wall. Its remains are still partially visible beneath the collapsed brick rubble.

Chimney 2 appears to have been used by a number of structures over the years. Initially it was used by Stove House 2 and possibly the north-western of the four fishery salt pans. This would have been the case for the majority of the 20th century up until c. 1950.

Phase 6: The abandonment of the fishery pans in the 1940s and 1950s appears to have seen the change in use of Chimney 2. A flue located during excavation of the Brine Shaft (see above, 1009, 1010) appears to pass directly towards Chimney 2. This flue served the boiler of the Engine House. When the fishery pans fell out of use, it is likely that the use of Chimney 4 ceased. Chimney 2 which was now not used by the north-western fishery pan, was used as a replacement flue.

Phase 7a: The brine shaft adjacent to the Engine House/ Brine Tank was abandoned in the 1940s and replaced by a brine hole in the location of the Nodding Donkey. The flue running from the engine

house boiler was probably abandoned and back-filled at this time (see above).

The demolition of the fishery salt pans was followed by the construction of Stove House 4 in 1956. As discussed above, a new over-ground flue was built between Stove House 4 and Chimney 2.

Phase 7b: Stove House 1 became disused as a practical stove house towards the end of the works in the 1970/ 1980s. Pan House 1 collapsed around this time. It is likely that the chimney was predominantly adopted by Stove House 3 at the very end of the works.

2.6 PAN HOUSE 3

Historic Background

Following the death of John Thompson Jnr, the Red Lion Hotel was demolished by Henry Ingram Thompson and the works expanded when it became known as Henry Ingram Thompson's Salt Works. Pan House 3 was constructed during the initial expansion of the Lion Salt Works between 1898 and 1901 (Phase 5). This required the partial demolition of the rhomboid building; and a pair of external fishery pans.

Pan House 3 is not shown on the 2nd edition Ordnance Survey map of 1898. It was not included in specifications written to Henry Ingram Thompson for two common pans on July 10th 1895; John Parkes response of 17th August 1895, or a further specification by Henry Ingram Thompson for the construction of four salt pans on 18th August 1895.³⁹ These appear to correspond to Pan House 1 and four fishery salt pans shown on the 'Stock List Plan' of 1900 as part of the expanded complex.⁴⁰ This includes three pan houses and is the first plan to show and list Pan House 3. The timescale between the demolition of the Red Lion Hotel and the construction of Pan House 3 is unclear. It appears to have occurred between 1895 and 1900. However, the Ordnance Survey map of 1898 should not be taken as a definitive dating tool as there would have been a period of lag between survey and publication.

³⁹ Specification of two common pans with hurdles etc. complete for H.I.Thompson, July 10th 1895

⁴⁰ Volume II, 3.52

The pan house is shown on detail on the 3rd edition Ordnance Survey map of 1910 in plan,⁴¹ with rail lines leading to the southern entrance. It made use of a railway siding brought in to the site from the earlier line, which John Thompson had laid to serve the Alliance Salt Works. Detailed building plans of the lines are located at the Weaver Hall Museum.⁴² Accounts show a transition of coal delivery from the canal to the railways during the First World War. After the Second World War coal and salt transport moved from canal and rail onto the road (see Volume I for details). Photographs from 1966 reveal the original form of the front of the Pan House was a hipped roof typical of pan houses in the area that covered the very front of the pan only (2.145, 2.146). Subsequently during the 1970s the current form of the southern end of the pan house was added to allow visitor access as a working museum (2.147, 2.148).



2.145: Pan House 3 during 1960s



23rd April 1966: Thompson's Salt Works, returning to the bus with salt packages.

2.146: Pan House 3, 1966



2.147: Pan House 3, 1980s



2.148: Interior Pan House 3 in the 1980s

Description

Pan House 3 is a two-storey warehouse building constructed in a combination of hand-made red-brick and European soft wood (BS001, BS002, BS003).

The principal gable façade (BS009; 2.149, 2.150) lies to the south and is faced in vertical softwood boards (6001), supplemented by corrugated plastic sheets (6002). A central two-bay entrance doorway (6053) is shielded by a one-storey baffle of 3" thick sleepers laid on side and retained by a series of four posts (6000). At ground floor level to the east of the entrance a replacement stud wall of planks continues at an angle (6004). Two doorways (6003, 6030) on either end at first floor level lead to the interior gangway.

The western elevation faces Ollershaw Lane (BS008; 2.151). It is in two parts. The main element consists of a low sill wall c. 1m in height of hand-made red brick in the Stretcher bond, two skins wide (6009). Above this is a timber-framed stud wall two stories high (6035), covered in soft wood clap board planks (6010). A dog-leg wall at the

⁴¹ Volume II, 3.51

⁴² Volume I, 9.12

south of the elevation denotes a later extension (see below). This has a low sill wall of machine-cut yellow-red brick in English Garden Wall bond (6005). Above this is a stud wall covered in vertical planks (6007) again with corrugated plastic sheets (6008).



2.149: Pan House 3, southern elevation



2.150: Pan House 3, southern elevation

The eastern elevation is similar in construction (BS010, 2.152) with a low hand-made red brick sill wall in Stretcher bond (6014) with timber-framed stud wall above covered in horizontal clap board planks (6020). No evidence for the extension of Pan House 3 is visible suggesting some of the planks have been replaced. Extending from the eastern elevation at pan (first floor) level are 11 horizontal joists (6015) to support an external

walkway. The remains of the risers and step of a series of stairs in the eastern elevation (6016) indicate the presence of steps to the external walkway that continued northward at first floor level in the gap between Pan House 3 and Pan House 4.



2.151: Pan House 3, western elevation



2.152: Pan House 3, eastern elevation

The northern elevation is gabled and conjoined with Stove House 3 (BS007; 2.153) and consists of a hand-made red brick wall three skins thick in the Stretcher bond (6026). Two doorways (6027, 6028) enter Stove House 4 at the western end from the pan level and the eastern end from the external walkway (discussed above). The roof is pitched with corrugated cement asbestos panels (6011; BS003 2.154), corrugated plastic panels for light

(6013) and asbestos weather boards on the southern gable (6012).



2.153: Pan House 3, north wall interior



2.154: Pan House 3, roof, western elevation

Internally the pan house is dominated by the central kiln on which the pan was built (6046; BS001, 2.155, 2.156). The floor at the southern end is of hand-made red brick on-side in the stretcher bond (6421), it is patched in places and elsewhere has been disturbed. This is carried through to the exterior of the pan, internally in the front of the baffle. In areas the brick floor has given way and the floor (in particular in the south-west corner) is of earth (6084). In the south-west corner is a brick-lined sump (6422).

The central kiln consists of a large rectangular structure (c. 7.5m E-W, c. 13.5m in size), externally faced in hand-made red brick in English bond to a height of c. 2.2m. The principal façade of the kiln (6060; BS013) lies to the south with four ferrous metal doors at c. 0.85m from floor level (6061, 6062, 6063, 6064). These allow coal to be fed internally to the fire pans and flues that lie beneath the pan. The kiln contains six flues orientated north-south with narrow interior walls of a single skin of hand-made tallow refractory

style brick in English Garden Wall bond (6075-6081). These walls are in poor condition with no mortar surviving and in a state of collapse. Within each flue is a thick layer of brown-red clinker ash and sand.



2.155: Pan House 3 interior, southern stove elevation



2.156: Pan House 3 interior, southern stove elevation

Either side of the kiln is in a state of collapse with repair visible to the brickwork (BS012, BS013). The lower brickwork consists of degraded hand-made red brick in English bond (west 6056, east 6059), on which, is directly constructed an upper, later, layer of hand-made red brick in English Garden Wall bond. The kiln wall is retained by a series of seven large brick piers on the western hurdles (6055, 2.157): three larger piers, 1.0m x 0.7m piers with narrower sets of three piers between, 1.0m x 0.2m. A further narrow pier lay beyond at the northern end. These are built directly on the brick floor of the ditch described below (6057). The eastern hurdles have an identical arrangement of brick piers (6059, 2.158). The largest piers at the southern end were both, on western and eastern sides in an advanced state of collapse.



2.157: Pan House 3, interior, western hurdles, south facing



2.158: Pan House 3, interior, eastern hurdles, north facing

Either side of the stove is the wooden framework of the hurdles and a brick ditch which served to drain excess brine from the gangway above. On the western side (BS001, BS002; 2.157) is a wide (c. 1.5m) ditch of machine-cut red brick laid on-side in Stretcher bond (6057). It gently slopes north-south and is sloped at an angle of 15-30° either side to a central gutter. This drains via a ceramic pipe to the south into a 1m square, 1.5m deep brick lined sump (6422). The hurdle walkway above is supported by a timber-framework of joists orientated east-west (6054). These are supported on the wall plate of the sill wall to the west and to the east by a longitudinal (north-south) beam lying between the brick piers of the hurdles. This supports a series of longitudinal floor boards that form the first floor walkway (6067, 2.159).

The eastern hurdles (BS001, BS002; 2.158) are similarly constructed but there does not appear to be any evidence of the brickwork of the drain at the current time, but a thick layer of humic brown silt rubble lines the floor. At the southern end a

framework of wooden timbers support the larger brick pier. This was partially exposed revealing a void beneath this pier and explaining the advanced state of collapse in which it was found. The wooden framework of joists of the eastern hurdles (6015), continue to the east to support a former walkway (see above). These support the plank boards of the eastern walkway (6068, 2.160).



2.159: Pan House 3 interior, south-east facing



2.160: Pan House 3 interior, north facing

In the south-western corner is a series of brick steps (6083) from ground floor level up to the walkway of the western hurdles. These are constructed in hand-made red brick in the Stretcher bond.

The southern end of both walkways has been added at a later date when the pan house was extended (1960-1970s). A series of new joists were added on both sides (6065, 6066) and new floor boards above on the eastern side (6069). The western floor boards continue suggesting that the western walkway was replaced. A series of wooden steps (6034) aligned east-west allowed access to the western walkway.

The pan (6046) is c. 11.3m x 7.3m in size, with a 0.6m rim above (BS003; 2.161, 2.162, 2.163, 2.164, 2.165). It is constructed of several sheets of ferrous metal riveted and welded together. At the north-western corner is a square hole known as the cotter hole) to allow the draining of the pan during work. Four large iron eyelets are set evenly on the edge of the pan just in from each corner designed to allow lifting of the pan and to allow access to the stove flues below. In the south-eastern corner of the pan was a wood and L-form steel jigger pillar designed to enable the lifting of the pan (6074, 2.165).



2.161: Pan House 3, interior, NW Facing



2.162: Pan House 3, interior, pan, west facing

Two salt dogs (6070, 6071, 2.163), metal rails designed for the loading of salt, hung on the eastern and western sides of the pan. On the southern end attached to the exterior of the pan is a wooden walkway in two parts above the stove doors, supported by a series of four iron frames (known as the dodging planks; 6072, 6073, 2.164). The hurdle walkways (6067, 6068; described above) ran on the western and eastern sides of the pan. The northern side of the pan was an earth floor formed where the original flues had collapsed.



2.163: Pan House 3 interior, pan and salt dogs, north facing



2.164: Pan House 3 interior, dodging planks



2.165: Pan House 3 interior, jigger pillar and beam, north-west facing

The roof is supported by a series of three trusses (6036, 6037, 6038; BS003, BS011; 2.166) evenly spaced and set on the main supporting posts at both sides (west 6041, 6042, 6043; east 6049, 6051, 6019). The north-eastern post of this series

is external to the structure and also supports the former external walkway (6015). The trusses consist of principal rafters in soft wood kept under tension by a series of three ferrous metal rods, one vertical from the apex, the other two diagonally connected to the base of the principal rafters. A tie-beam is located in between, and the structure has been strengthened by inserting simple vertical posts that act as Queen posts. A series of six staggered purlins support the roof on either side (west 6039, east 6047).



2.166: Pan House 3 interior, north facing

The southern end of the roof is an addition. The western purlins (6039) have been cut to accommodate the southern extension; the eastern purlins (6047) continue to extend to the south revealing the former line of the hipped roof. Two posts (6040, 6050) support two additional principal rafters (6425, 6426) which in turn support a series of five purlins on either side (6419, 6420). Over this continues the cement asbestos covering of the roof.

Phased Interpretation

Phase 5: Pan House 3 was originally constructed in Phase 5 of the works during the initial expansion of the works in the first decade of the 20th century. It is probable that large elements of the stove, the hurdle ditches, the structure of the hurdles and some of the fabric of the shell date to this period. The quantity of truly original fabric is debatable as replacement and repair was a continual occurrence. Repairs can be seen in the brickwork, wooden roof trusses and wooden hurdles.

The original stove was coal fed. Tom Lightfoot's ⁴³ description of the working of the pans enables a full understanding of how this pan functioned. Originally the pan would have been coal fed via the ferrous metal doors on the southern end of the stove. The fires would have been set at the front of the pan only. The hot air from the fires would travel north along the pan heating the remainder of the pan by indirect heat. ⁴⁴ The six separate flues were aligned north-south under the pan, with an area at either side known as the dead draft adjacent to the edge of the pan. From here the flues would continue north into Stove House 3 via a series of underground flues, these are currently buried and require further investigation. The alignment is clearly different to other Pan House/ Stove House arrangements as the chimney is not located between Pan House 3 and Stove House 3 (unlike the one historically recorded by Tom Lightfoot).

The pan is probably original with extensive repairs. It is doubtful whether any of the original plates survive as repair was a continual element of the job conducted by the 'pansmiths'. ⁴⁵ Details of specifications for the construction of the pan enable an understanding of its construction. The base of the pan was of Siemens Martin steel, the angles of the pan (ie. the corners prior to the sides) were to be of steel or brown iron and 100° obtuse angle and the sides were to be of brown iron. The base was formed of a large number of plates welded and bolted together. The specification and an associated plan shows the alignment of the plates as much thicker towards the front where the fires were placed and narrower to the rear. This meant that the size of the plates reduced but the quantity increased. The thickness of the plates was variable between 3/8" at the front to 5/16" in the middle to 1/4" at the rear. This was clearly designed to accommodate the heat of the fires that would be at its greatest at the southern end of the pan and less at the northern end. The plates were riveted together using 3/4" diameter rivets in the side of the pan and 5/8" diameter rivets in the base of the pan.

⁴³ Fielding 2000

⁴⁴ Fielding 2000, 12, fig. 15

⁴⁵ see Fielding 2000, 61-64

Three hoops for lifting the pan were positioned at either side. The pan was drained via the ‘coffer hatch hole’ that was 4 1/2” square.

The salt dogs, the metal plate of three iron straps hung from either side of the pan, were designed for the filling of the wooden (and later fibreglass) salt tubs. The process known as ‘tubbing’ was carried out by the ‘lumpmen’ described by Tom Lightfoot.⁴⁶

The hurdles along both western and eastern sides of the pan appear to be in the original locations. The extent to which they were original is arguable but the majority of the timbers of the barricading or stud wall, and the hurdles are closely aligned to the details of the specifications for the other pans, notably;

*‘Side hurdles to be 7’6” wide carried on bearers 9” by 4” spaced 3’0” apart outside ends of side hurdles to be secured with [bate?] and screw bolt to posts of barricading, inside ends to be carried same as middle hurdles on 8 pillars capped with timbers’.*⁴⁷

This appears to suggest that the layout of the hurdles was as originally envisaged and has been replaced piecemeal over the next 70-80 years.

Phase 6: The pan may be original but will have been repaired several times.

It is almost certain that the brick piers of the hurdles are part of a continual process of renewal and repair to the hurdles throughout the 20th century. Those originally described in the specifications were;

*‘...9” brick pillars on each side tied into an projecting from the pan wall’.*⁴⁸

The brick piers now visible around the stove of Pan House 3 are not all tied in and given the current fragmentary nature of the stove walls it would seem surprising if these structures had survived the intervening years intact. It seems more likely

that they have been replaced continually reusing brick where possible.

Phase 7: The southern end of the pan house was radically altered in Phase 7. The front of the pan was originally open with a hipped roof a common feature of pan houses including Pan House 5, and Pan House 1 (see historical background above). This was subsequently replaced with the current arrangement of stud walls. A rationale can be suggested for the replacement of the end area of the salt works. Firstly is that it became part visitor attraction in the 1970s and this eased access to the salt works for tourists. Secondly is that it was altered to allow the use of oil in common with Pan House 4.

Phase 8: The hurdle framework was altered by the addition of the southern end of the walkway. This appears to date to the 1980s or 1990s although it may be part of Phase 7 alterations that have subsequently been improved in Phase 8 by the addition of a well-made series of steps.

The jigger visible at the south-eastern corner of the pan was designed for lifting the pan. The specification describes six around the pan, one located at each hoop. They are described by Tom Lightfoot in detail.⁴⁹ The tool is designed to attach to the hoop on the side of the pan, the boom is then lifted to increase the height of the pan and a pin put in the upright metal post (known as the jigger pillar in the specifications). The pan would need to be lifted to clean the flues or alternatively remove redundant plates and rivet new plates onto the base of the pan. It is not clear what date the jigger is from but as it is alone and all of the other jiggers have been removed it would appear to be a recent addition for display and not original.

Phase 9: A stud-wall has been inserted to support the roof at the northern end of the pan house during the 2009 enabling works.

⁴⁶ Fielding 2000, 26-29

⁴⁷ Specification of two common pans with hurdles etc. complete for H.I.Thompson, July 10th 1895

⁴⁸ Specification of two common pans with hurdles etc. complete for H.I.Thompson, July 10th 1895

⁴⁹ Fielding 2000, 61-64

2.7 STOVE HOUSE 3

Historical Background

Stove House 3 was originally constructed in Phase 5 during the initial expansion of the work in 1898-1900. Some of the fabric belongs to a slightly earlier period as it can be attributed to the construction of the adjacent Link Block. The 2nd edition Ordnance Survey map⁵⁰ clearly denotes the construction of Pan 1 and Stove House 1 suggesting the northern wall of Stove House 3 was built prior to 1898.

Historic images from the 1970s and 1980s (2.167, 2.168, 2.169) show the building remained largely intact until the final years of the works.

The northern bay of the stove house collapsed in the early 2000s. It was dismantled during the 2009 enabling works. Subsequently the northern wall of the stove house almost entirely collapsed and lies in a derelict state.



2.167: Stove House 3, western elevation, advertising lettering still visible



2.168: Stove House 3, interior, 1970s



2.169: Stove House 3, warehouse level interior in 1989, prior to collapse

Description

Stove House 3 is located directly north of Pan House 3 and is interconnected. It is two-and-a-half-storey warehouse building, the lower floor (denoted as the flue level) lying level with the upper pan level of Pan House 3 and a further warehouse level above. Below this the ground consists of the buried remains of flues (see BS015, BS016).

The southern elevation faces and abuts Pan House 3. It is constructed in hand-made red brick in English Garden Wall bond (6026) for the lower (buried), flue and the base of the warehouse level. The upper gable is in-filled with a wooden stud wall incompletely faced in horizontal clap boards (6087, see above 2.154). Two entrances at either end allow access to the flue level, the western directly from Pan House 3 (6028), whilst the eastern (6027) enters from the now dismantled walkway. It has collapsed and is stored.

The western elevation faces Ollershaw Lane and consists of eight bays of pier and panel construction in hand-made red brick in the English Garden Wall bond (6088; BS022; 2.170). The exterior has been strengthened by the use of seven vertical cast iron I-beams (6089-6095) that correspond to the location of internal piers. These are tied to each internal transverse beam (6125-6131). Between the third and fifth bays were two wide wooden casement window frames that had been subsequently blocked (6096, 6097).

⁵⁰ Volume I, 5.5



2.170: Stove House 3, western elevation, south-east facing

The eastern elevation directly abutted Stove House 4 and formed the partition wall between the two structures (see BS041). However, originally it would have faced onto an open yard prior to the 1950s. Like the western elevation it consisted of eight bays of pier and panel hand-made red brick wall in English Garden Wall bond (6120). Like the western elevation the exterior was strengthened by a series of vertical cast-iron I-beams (6340-6345, 6415) that corresponded with each pier on the interior. The northern bay was partially collapsed. A single doorway (6132) entered Stove House 4 on the third bay from the north and a blocked wooden casement window (6122) was located on the sixth bay from the north.

The northern gable elevation had almost entirely collapsed (BS070; 2.171). The remnants consisted of a small portion of curved exterior wall in hand-made red brick in English Garden Wall bond (6098) adjacent to Chimney No 1. A small section of the northern wall in hand-made red brick in English Garden Wall bond had almost entirely collapsed (6194). The remaining collapsed material was still present on site. This northern gable was originally constructed in hand-made red brick to the base of the warehouse level and then the valley roof structure was connected to the former pitched roof of the Link Block.



2.171: Stove House 3, northern gable collapsed

The interior of the flue level is open (BS015, BS023, 2.172, 2.173). The floor level has seven raised, north-south flues (6133-6139, 2.174) constructed of either hand-made red brick or refractory style yellow brick in Stretcher bond. Each flue is 0.8-1.0m in width one skin thick, poorly constructed with no surviving lime mortar. It is unclear whether this was a result of them being dry-laid or because salt mortar had been used which had subsequently corroded. The flues survive to a maximum of six courses high (c. 0.4m) with some only surviving as footprints. They are capped by corroded rectangular ferrous metal plates, with smaller ridged rectangular ferrous metal spacers (6142-6147) that only survive in places. Between each flue is a ditch containing layers of accumulated and hardened salt (6149-6154), which survive to over 1m in depth below the current floor level.



2.172: Stove House 3, interior flue level, south facing



2.173: Stove House 3, interior flue level, south facing



2.174: Stove House 3, raised flue, west facing

At the southern end, a single below-ground flue runs east-west (6140; c. 1m in width, 2.175), capped by a series of eighteen corroded rectangular ferrous metal plates, with smaller ridged rectangular ferrous metal spacers (6148). These have collapsed and form an uneven floor level. The northern end has a similar flue (6141, 2.176) which has almost entirely collapsed. The flues were fed from the flues beneath Pan 3 (6075-6081) into flue 6140. From their hot air was drawn through the north-south flues (6133-6139) via flue 6141 to Chimney 1 located in the north-west corner.

Within the western wall were two bricked-up windows (with glazing bars still visible, BS018) and a single window in the eastern wall (glazing bars still in place, BS019) suggesting that originally the room had greater natural light. Those in the eastern wall gave on to Stove House 4 but would originally have given onto the open yard and fishery pans to the north. The western exterior outer wall has the remains of sign writing advertising Ingram Thompson's Salt Works.



2.175: Stove House 3, below-ground flue, southern end, west facing



2.176: Stove House 3, northern wall collapsed, north-east facing

The first (warehouse) floor above is supported by a combination of six horizontal I-beams aligned east-west, (6125-6131, see BS016, 2.177) which are in turn supported by a series of 21 cast-iron columns (6155-6175). There are three cast-iron columns supporting each I-beam staggered in an uneven plan throughout the stove level. The 5½" wide cast-iron columns were set on the loose salt below, and had a trough to take the I-beam above. A single wooden beam lay on the upper face of the I-beam that supported the floor boards (6176, 6177, 6178) of the first floor. At the northern end the floor boards had begun to collapse.



2.177: Stove House 3, Column and I-beam supporting warehouse floor, west facing



2.178: Stove House 3, interior flue level, column and I-beam support, north-west facing

Two vertical I-beams (6195, 6196) have been used to strengthen the support of I-beam 6131, of which 6196 is heavily bent (2.178). The integrity of the west and east walls were strengthened further by vertical iron rails on the exterior faces (6089-

6095; 6340-6345). These had been bent over the horizontal beams (presumably in the smithy) thus tying the structure together.

The floor boards of the warehouse level are aligned north-south, 2.5-3" thick and 6" wide (6176), declining to 4" on the outer six boards (6177, 6178). They are of softwood with a cast-iron fillet between the boards. Water damage has weakened the boards in areas. Patching using elm wood planks taken from dismantled salt tubs has been used on the upper surface of the floor boards (6197; BS016; 2.179, 2.180).



2.179: Stove House 3, warehouse level, elm wood floor boards, south-east facing



2.180: Stove House 3, warehouse level, elm wood floor boards, south facing

A series of 18 square or rectangular salt traps (6179-6193, 6198, 6199, 6417, 6418), openings in the floor are spaced irregularly throughout the floor. These allowed salt to be passed from flue to warehouse level. The traps are supported by one or two trimmers either side (2.181 shows one hatch). Some of the salt traps had hatches, consisting of two thick boards, two or three boards wide.



2.181: Stove House 3, interior flue level, salt hatch, west facing

A system of weighted damper plates allowed the flow of hot air through the flues to be controlled from either Pan House 1 or 3. These were controlled by a series of cables along the underside of the beams attached by hooks and pulleys. A large teardrop weight that had collapsed at the southern end acted as a counter-weight for the damper plates (2.182).



2.182: Stove House 3, flue level, tear-drop counter-weight for damper plates and pulley

The upper warehouse level is entirely open except for where the roof structure extended down into the main body of the building (2.183, 2.184). A

single wide entrance (6121) had been cut in the eastern wall that gives onto the warehouse level of Stove House 4. This forms a short corridor that is covered with a corrugated cement asbestos roof (6124).

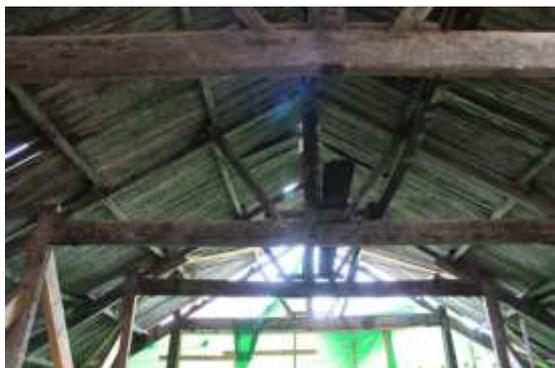


2.183: Stove House 3, warehouse level, north facing



2.184: Stove House 3, warehouse level, southern elevation

Originally eight aisled trusses (6106-6113; BS017, BS023; 2.185, 2.186) would have supported the roof structure (the northern had collapsed). The seven surviving trusses consist of two aisle posts supporting the principal rafters. The aisle posts rested on a pad that in turn rested on the I-beams of the floor structure. The truss had a tie-beam and central King post. This supported a series of five staggered purlins (6101), of seven members each connected to the principal rafters by clasp joints. The roof was lined with a series of softwood planks laid horizontally (6102). The trusses had been subsequently supported by a series of diagonal wind braces (6104) between the aisle posts as part of the 2009 remediation work. The work also involved the insertion of a large rigid steel joist (6105) to support the upper part of the western wall (6088).



2.185: Stove House 3, warehouse level, trusses, north facing



2.186: Stove House 3, warehouse level, trusses of collapsed roof level in 2009, south-east facing

Phased Interpretation

Phase 2-4: The northern wall of the stove house that formed part of the Link Block appears to have adopted the form of the original entrance to the Red Lion Hotel. This had a curved entrance on either side of a roadway that led up to the main buildings of the hotel. When the Lion Salt Works took over the site in 1894 the first pan and stove house (Pan and Stove House 1) adopted the boundaries and previous buildings. It was only after 5-6 years when the site was radically reorganised at the end of the 19th century that these were lost.

Phase 5: The original elements of Stove House 3 certainly date to Phase 5 and were constructed 1898-1900 like Pan House 3. The plan of the flues adopted the same chimney as Stove House 1 located in the north-west corner in a triangular land plot between the two stoves. The outline of the flues almost certainly reflects the original alignment. This involved a series of north-south flues led from the stove, this went up and back

towards the south prior to being drawn up the chimney along the flues on the western side. The metal plates of the flues survived in places but were badly decomposed by salt. It seems likely that a continual process of replacement occurred throughout the lifespan of the works. The ditches between the flues had completely filled with salt and it is difficult to gauge if there was any brick paving between each flue. The process of clearing the flues during restoration should reveal if paving occurred throughout the stove house. The flues allowed the lumps of salt formed in the pan house to be dried. They were brought into the stove on carts and placed in the ditches by the 'lumpman'. The 'lofter' the salt workers who operated in the stove, would then move the lumps on to the metal plates of the flues where the heat of the flues caused the lumps to dry. The process is described by Tom Lightfoot.⁵¹

The majority of the floorboards of the warehouse appear to be original, although some floor boards have begun to decompose. Within the planked floor the salt traps survived. They were distributed in a spatially uneven pattern (in contrast to the geometric pattern of Stove House 5, see below). The salt traps were originally opened to allow the 'lofters' to move the lumps of salt to the warehouse above when dry. The process involved throwing each lump of salt with a pronged tool up onto the warehouse floor above until the area around each hatch was clear. The process is described in detail by Tom Lightfoot.⁵²

Phase 6-7: The collapse and decay of some of the floorboards on the warehouse floor resulted in piecemeal patching of the floorboards and strengthening using available material. In this instance it was a combination of discarded wood and the sides of elm salt tubs.

Phase 8: The collapse of the northern gable end connecting to Stove House 2 occurred after the closure of the works in 1986 but prior to 2005.

Phase 9: The wind-braces and rigid steel joist in the upper warehouse level are part of the process of support begun in 2009.

⁵¹ Fielding 2000, 52-55

⁵² Fielding 2000, 52-55

2.8 PAN HOUSE 4

Historical Background

The area of Pan House 4 was originally built as a series of three butter pans in a large rhomboid-shaped building. The rhomboid-shaped building is shown on the 3rd (1910)⁵³ and 4th (1938) editions of the Ordnance Survey map. The stock control plan of c. 1900 does not show the rhomboid-shaped building.⁵⁴ It instead shows two fishery pans to the north and two butter pans, the third having been demolished to build Pan House 3. This corresponds to the earliest aerial photographs from the 1940s that show the area with the outline of the four pans.⁵⁵ The Ordnance Survey map of 1954⁵⁶ shows the area with only the more northerly two pans surviving suggesting that both the rhomboid-shaped building and the butter pans had been demolished.

During the 1950s the area was radically altered as Pan and Stove House 4 were rebuilt. Stove House 4 was rebuilt in 1956 as shown by a series of building plans by Joseph Parks Constructional Engineers of Northwich dated to 26th April 1956.⁵⁷ It is likely that Pan House 4 was contemporary construction. It was built by Alan Thompson following the death of Henry Ingram Thompson. It was later operated by his son Henry Lloyd Thompson. It corresponded with the construction of a new brine bore-hole and the purchase of a second hand engine and pump that form the pump house complex.

The original form of Pan House 4 was hipped roofed in common with Pan House 3. This is shown on an image from the 1950s (2.187).

The Ordnance Survey map of 1970⁵⁸ shows Pan and Stove House 4 in plan aligned north-south and parallel to Pan and Stove House 3. It does not show the large cylindrical oil tank at the southern end of the Pan House. This was added during the 1970s and was necessitated by the difficulty of obtaining the right type of coal at economic prices. It was never truly successful as the oil residues

tended to damage the brickwork. The roof plan was altered at this time and was reconstructed as it currently stands (2.188).



2.187: Pan and Stove House 4 in the 1950s, south-west facing



2.188: Pan House 4, southern elevation in the 1970s, north-east facing



2.189: Pan House 4, roof in the 1990s, north facing

The roof was also altered but the dating is unclear. It has remained unchanged since the 1990s when plastic corrugated sheets covered the apex (2.189). The eastern elevation was originally clad with horizontal planks (see 2.190). It has been subsequently repaired in 1990 (see 2.191) but was again damaged by vandalism and now has only a

⁵³ Volume II, 3.51

⁵⁴ Volume II, 3.52

⁵⁵ Matrix 2011, fig. 11

⁵⁶ Ordnance Survey, 4th Edition, 6" to the mile

⁵⁷ Weaver Hall Museum collection

⁵⁸ Ordnance Survey Map, 1970, 1:25,000

partial wooden cover. The western hurdles survived into the 1990s (see 2.192) but have subsequently collapsed. The interior of the pan house survives largely intact at pan level (see 2.193, 2.194). Collapse of the northern wall has been going on for a number of years and only partially survived during recording.



2.190: Pan House 4, eastern elevation in 1990, south-west facing



2.191: Pan House 4, during repair in 1990, north-west facing



2.192: Pan House 4, western hurdles prior to collapse, north facing



2.193: Pan House 4, during repair in 1990, north-west facing



2.194: Pan House 4 interior, 1990s, north-east facing

Description

Pan House 3 is located to the east of Pan House 3, and directly south of Stove House 4 to which it is connected. It is a two-storey pitched roof structure.

The principal façade lies to the south (BS028, BS032, 2.195) and was originally a wooden stud wall that partly survives internally to the structure (post 6222, vertical studs 6247, 6262, 6263, collapsed mid-rail now removed 5094). This is covered in vertical soft wood boards (6264). A single doorway (6265) with two wooden jambs and a worn wooden sill enters the western hurdles. This would have been part of an element that extended south from the stove that included

a north-south stud wall and post (6287, 6288). On the western side of this area is a series of hand-made red brick and wooden steps to the western hurdle walkway (6220).



2.195: Pan House 4, southern elevation

The eastern side of this stud wall has been covered with asbestos sheets (6207) and mesh (6206). Likewise a small survival of a north-south stud wall was represented by a low sill beam and rail (6290). The original roof would have been hipped. Like Pan House 3, a WNW-ESE palisade (6200; 2.196) of four vertical posts and horizontal wooden sleepers is located on the lower ground floor.



2.196: Pan House 4, wooden palisade, north facing



2.197: Pan House 4, oil tank, north facing



2.198: Pan House 4, western elevation

The stud wall has been subsequently obscured by a lean-to structure (6203, 6204; 2.195, 2.196) and the two storey oil tank (6202; 2.195, 2.197) that

dominates the southern façade. The oil tank is circular plan (2.75m in diameter, 7.85m tall), on a square concrete base. The tank has been incorporated into the poorly built lean-to structure. This is poorly built in timber with corrugated iron facing adopting the wood palisade (6200, see above) and corrugated asbestos roof that extends around the oil tank and connects to the southern façade.



2.199: Pan House 4, eastern elevation, c. 1990, north-west facing



2.200: Pan House 4, eastern elevation, south-west facing

The western elevation (BS027, BS031; 2.198) consists of a low c. 1m high hand-made red brick sill wall, constructed in English Garden Wall bond, collapsed centrally and now in two parts (6218, 6219). Above this rising to the eave line is a two-storey high timber stud wall (6229) with four of five original posts (6222, 6223, 6224, 6225)

surviving. The posts, with the exception of 6222 which was solid, are constructed of treble studs. These are covered by horizontal, soft-wood clapboards (6227). The stud wall has raked badly towards the south, but the clapboards have been applied horizontally at a later date over the top and with no consideration of the underlying stud structure. In places these have decayed and part of the stud wall had collapsed.

The eastern elevation has been heavily altered (BS029, BS033; 2.199, 2.200). The low hand-made red brick stud wall, again in English Garden Wall bond (6245) survives to a height of c. 1m. The stud wall has been entirely removed, and replaced at the first floor level by a soft wood timber panel wall (6246). The remainder is open.

The northern elevation is shared with Stove House 4. Originally it was built in hand-made red brick in English Garden Wall bond (6268) gabled to the second floor level. The poor structural condition has led to continual collapse over the last few years and it was in poor structural condition with only half of the wall surviving at commencement of recording during 2012 recording work. This compares with the historic record produced from the Laser Scan data in 2004 that shows over 80% of the wall surviving. During structural propping of the Pan and Stove House 4 it became apparent that the wall was dangerously unsound and was allowed to collapse under controlled conditions. Two doorways (6269, 6270) with plain plank and baton doors at either side of the pan gave access between Pan House 4 at pan (first floor) level and Stove House 4 at flue level.

The ground floor is dominated by the rectangular kiln aligned north-south, 12.4m long by 6.2m wide (BS024; 2.201). The principal façade of the stove faced south (6292; BS036) and had four openings onto the firing flues (6293-6296). It is constructed in hand-made yellow-red brick in English Garden Wall bond (7 stretchers to one header). The doors to the stove had been removed and the coal-based system of firing had been replaced with an oil based system fed from the adjacent two-storey oil tank (2.202, 2.203, 2.204, 2.205, 2.206). This was achieved by a series of three ferrous metal pipes which are now highly corroded (6291), with

individual rubberised piping feeding to taps mounted at each opening to the firing flues. The three pipes continued horizontally to the south where they were fed by a compressor and regulator (6297) directly connected by a series of valves to the oil tank. The combination of oil under gravity-driven pressure supplemented by the compressor released the oil to spray into the flue thus creating a new fuel source. The remains of the electric fuse board (6298) from the compressor lay discarded to the south.



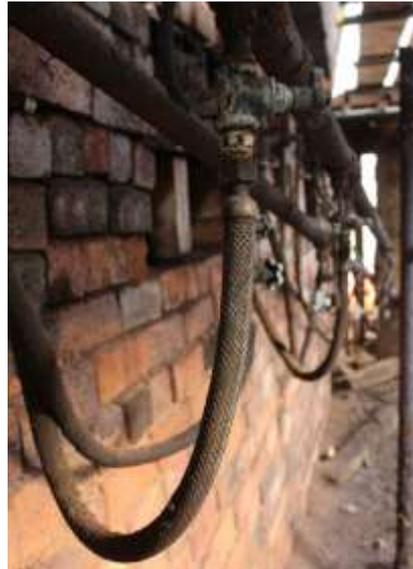
2.201: Pan House 4, stove southern elevation



2.202: Pan House 4, stoves during use in the 1970s



2.203: Pan House 4, stoves during use in the 1970s



2.204: Pan House 4, stove, oil apparatus detail, east facing



2.205: Pan House 4, oil apparatus, tap detail



2.206: Pan House 4, oil apparatus, valve detail

The western wall of the kiln has partially collapsed and two phases of brickwork are visible (BS035; 2.207, 2.208). The earlier consists of degraded hand-made red brick in English bond (6277). The stove has been rebuilt directly over this on the western side by a layer of hand-made yellow 'stock type' bricks in English Garden Wall bond (6282). A series of four rebuilt brick piers retain the kiln wall, forming five bays (6280) again of hand-made yellow brick in English Garden wall bond. The piers are of two sizes, the larger two on the outside, with the smaller two on the inside. All are built directly on the brick floor of the ditch (6221).



2.207: Pan House 4, western hurdles, north facing



2.208: Pan House 4, western hurdles, south facing

The eastern wall is similar to the western (BS033; 2.209, 2.210). The original kiln wall is again of two phases, the earlier hand-made red brick in English bond (6279) beneath a phase of yellow 'refractory type' bricks in English Garden Wall bond (6283). The brick piers are again of hand-made yellow-brick in English Garden Wall bond (6281), with again two larger brick piers either side of two smaller central ones.

Internally the stove has four flues sub-divided by three internal walls (6284, 6285, 6286) of yellow

refractory style brick in Stretcher bond. This is filled with a mix of ash and clinker waste.



2.209: Pan House 4, eastern hurdles, south-west facing



2.210: Pan House 4, eastern hurdles, north facing

The western ditch (6221) slopes gently from north to south and was lined with well-made machine-cut bricks on side in Stretcher bond. It slopes at an angle of 15-30° either side and emptied to the south via a ceramic drain into a brick-lined sump (6254). The sump is not aligned in the orientation of the kiln, pan house walls or any of the other features indicating that it had been retained from the structures, probably the fishery pans that pre-existed the construction of Pan House 4.

The timber-framework of the western hurdles (2.207, 2.208) is supported on the west by a large rail mounted on the studwork wall of two timbers, scarf jointed together (now removed, 5073); a central support consisting of a series of horizontal posts mounted on a sill beam with a beam above (6276) and on the east a long-beam running along the top of the brick piers. This framework supports a series of five horizontal joists, mounted in pairs or triplets that run east-west (originally seven joists, two have collapsed, with 11 timbers

surviving). These in turn support 9" wide, 3" thick floor boards of the hurdle walkway (6253; 2.211), which are orientated north-south. At the time of recording the western hurdles are badly damaged, with partial collapse centrally where rain infiltration from missing roof boards had caused decay and ultimately collapse (5071, 5072). This has been worsened at the northern end of the hurdles where the collapsing wall (see above) has led to the collapse of much of the very northern end of the hurdles.



2.211: Pan House 4, western hurdle floorboards, north facing



2.212: Pan House 4, eastern hurdles floorboards, north facing

The eastern hurdle (2.209, 2.210) supports are similar to the western side consisting of east-west horizontal joists (6259; 16 in total, in 9 sets)

supported on the edge of the stove wall and a row of central posts (6278). Vandalism to the outer stud wall means they were free-standing on this side. The joists have begun to collapse at the northern end where the partition wall has collapsed. These supported a series of 9" wide, 3" thick floor boards (6258, 2.212) that intermittently survive and form the eastern walkway adjacent to the pan. The ditch of the eastern hurdle (6260) is again of machine-cut red brick laid on-side. It slopes north to south, with sides sloping at an angle of 15-30°. At the southern end it drains into another brick-lined sump of hand-made red brick construction (6300).



2.213: Pan House 4, pan, north-west facing



2.214: Pan House 4, pan, north-east facing

The pan (6250) is 10.7m by 6.2m in size of ferrous metal sheets welded and bolted together (2.213, 2.214, 2.215). It rests on top of the stove structure with an overhang above the stove at its southern end. A series of salt dogs, of ferrous metal hang on both the western and eastern sides. At the southern end the remains of the ferrous metal supports for the dodging planks survive. The remains of a ferrous metal brine pipe rise vertically from the floor before emptying into the pan (2.216). Damage has been caused to the pan base

where the wall has collapsed southward at a number of times over the years.



2.215: Pan House 4, pan east facing and wall collapse



2.216: Pan House 4, southern end of pan and brine pipe, east facing

The roof trusses all replace earlier hipped roof. A series of ten large posts support five roof trusses (west 6213-6217, east 6212, 6241-6244; BS034, 2.217, 2.218). The posts display carpenters marks and are cut with joist sockets along their length suggesting that they are re-used longitudinal beams. The five trusses (6230-6234) are of King post design with raking struts to the principal rafters. The tie-beams are likewise re-used but have been cut to size using a chain-saw, as the

marks are clearly visible on the faces. The trusses support a series of five staggered purlins on either side (west 6249, east 6256) each purlin consisting of five members. The purlins are clasp jointed to the principal rafters. The roof is covered with corrugated cement asbestos sheets (6239, 6248; 2.219, 2.220).



2.217: Pan House 4, trusses, north-west facing



2.218: Pan House 4, truss detail, north facing



2.219: Pan House 4, roof, western elevation, north facing



2.220: Pan House 4, roof, eastern elevation, north facing

Phased Interpretation

Phase 6: The location of Pan House 4 was originally associated with a Rhomboid shaped building visible on the 3rd edition Ordnance Survey map of 1910 and subsequent editions until its demolition in the 1940s. It is difficult to access if any elements of the current building retain earlier fragments. It does seem possible that the brick sump in the south-west corner which is aligned contrary to the building has been retained or reused from the earlier structure.

Phase 7a: The vast majority of the Pan House 4 structure can be attributed to its build in c. 1956. At this time it was a hipped roof structure in common with other pan houses. This can be seen in pictures dating to 1966 (see above Pan House 3). The plan of the southern end would have included an extension to the south that was an entrance to the western hurdles. This was via surviving doorway (6265) with a set of steps to the western hurdle walkway (6220). The eastern side may have been similar but much less survives. The front of the stove where the fires were set would have been open to the elements, except for the wind-protection provided by the wood baffle (6200).

The barricades on western sides are in the original location, but the eastern side has now been removed (it survived until the 1990s). These contained posts made of triple studs that would have supported the original roof trusses.

The stove wall has partially collapsed and been subject to repair but the original appears to have been made of hand-made red brick.

The process and layout seem to have remained identical to Pan House 3 (see above) in this phase of the works. The flue alignment varies from Pan House 3 and perhaps reflects later alteration. The processing of the salt probably remained remarkably unchanged at this stage.

Phase 7b: The pan was radically altered in the late 1960s or 1970s as it was converted to oil. This included the removal of the southern pan house elevation and the addition of the oil tank, compressor, pipework and lean-to structure. It is possible that much of the later brickwork associated with the rebuilding of the stove dates to this period. The flue alignment varies to Pan House 3 perhaps suggesting that it had been changed to accommodate the use of oil.

The process of salt production would have remained unchanged. However, the use of oil would have reduced cost (reflected in the cheaper comparative price of oil in the early 1970s with the discovery of North Sea oil). It would have also reduced labour costs as the necessity for stokers for the stoves would have been much less.

It would also appear to have resulted in the entire replacement of the roof structure. The use of massive timber posts and roof trusses appear to have been the ultimate design of the pan house. Where relatively lightweight structures were previously used these were replaced by an entirely separate roof structure, with the original structure used as an outer shell only.

Phase 8: The collapse of the eastern barricade due to vandalism resulted in replacement with a timber wall along the first floor level attached directly to the posts.

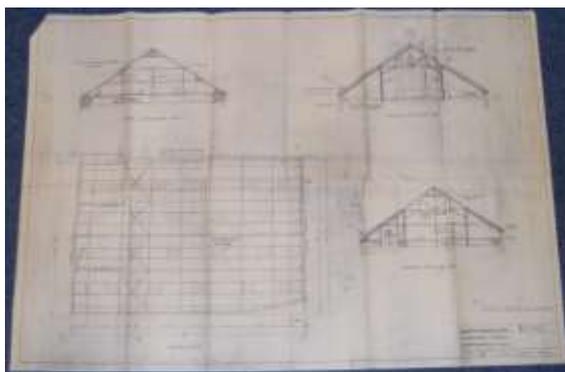
2.9 STOVE HOUSE 4

Background History

The area of Stove House 4 was originally the location of the Red Lion Hotel. Built in the late-18th to early 19th century it extended under what is now the northern end of Stove House 4. The Red Lion Hotel was demolished in the late 1890s and replaced by a series of fishery or common pans. Two fishery pans are shown on the 3rd (1910) and 4th (1938) editions of the Ordnance Survey map.⁵⁹ The earliest aerial photographs from the 1940s show the area with the outline of two butter and two fishery pans (see section 2.8 above).⁶⁰ The Ordnance Survey Map of 1954⁶¹ shows the area with the more northerly two pans beneath Stove House 4 surviving.



2.221: Designs for Stove House 4 dated 1956



2.222: Designs for Stove House 4 dated 1956

Stove House 4 was probably constructed at the same time as Pan House 4 in the 1950s. Stove House 4 was rebuilt in 1956 as shown by a series of building plans by Joseph Parks Constructional

⁵⁹ Volume II, 3.51

⁶⁰ Matrix 2011, fig. 11

⁶¹ Ordnance Survey, 4th Edition, 6" to the mile

Engineers of Northwich dated to 26th April 1956 (2.221, 2.222).⁶² The Ordnance Survey map of 1970⁶³ shows Pan and Stove House 4 in plan aligned north-south and parallel to Pan and Stove House 3.



2.223: Stove House 4 in the 1960-1970s, north facing



2.224: Stove House 4, flue level in the 1980s



2.225: Stove House 4, flue level in the 1989

Stove House 4 survives largely intact. A number of images show the stove house in use during the

⁶² LSW NOCMS : 1986/3783/10/20

⁶³ Ordnance Survey Map, 1970, 1:25,000

1960s to 1990s (2.223, 2.224, 2.225). The stove house survives except where the southern wall had begun to collapse and part of the northern wall had collapsed prior to survey.

Description

Stove House 4 is a large rectangular plan warehouse with flues running at the lowest (first floor) level. It adjoins Pan House 4 to the south, is built against Stove House 3 to the west and the packing area to the north (BS038, BS039).

The southern wall (6268; described above) co-joins Pan House 4 and has collapsed. Two doorways (6269, 6230; see Section 2.8) enter from the south. Above warehouse level, the gable is carried up in a stud-work of L-form ferrous metal (6316) covered in corrugated cement asbestos (6356).

The western wall (6210; see Section 2.8, BS041) also co-joins Stove House 3 (above) and had been extended as a hand-made brick wall in English Garden Wall bond (6272) during the construction of Stove House 4. Two doorways, one from Stove House 3 at the northern end (6132; described above), a second doorway at the south entered from the former walkway between Pan House 3 and 4 (6273). The doorway had plain wooden lintel and jambs.

The eastern elevation is open and plain of hand-made yellow-red brick in English Garden Wall bond (6301; BS045; 2.226, 2.227). A series of ferrous metal I-beams support the exterior of the wall. A connected vertical and horizontal I-beam (6274, 6275), built into the brickwork, reinforce the south-west corner of the stove house. A second pair of vertical I-beams (6302, 6303), are set against the exterior of the brickwork to act as support. From the warehouse level, a wide doorway (6304) opens onto the former loading bay walkway (removed in 2009). This had a plain wood lintel but had subsequently collapsed. The warehouse floor level slopes down to accommodate the change in floor level between interior and exterior.

The northern wall (6331; BS044, BS097) is shared with the Loading Bay/ Packing Area to the north. It is constructed in hand-made red brick in English Garden Wall bond. It has been subject to

substantial collapse at the western end and rubble was visible in the space adjacent to Chimney 2, north of Stove House 4. The wall ends shortly above the warehouse level and the gable is carried up with a stud wall of L-form ferrous metal (6317) covered by corrugated asbestos sheets (6357).



2.226: Stove House 4, eastern elevation, south facing



2.227: Stove House 4, eastern elevation, north-west facing

The plan consists of two levels: the lower hothouse or flue level (effectively at first floor level; BS038, 2.228, 2.229) has a series of seven raised brick flues, aligned north-south (6390-6396). These are fed from the flues beneath Pan 4 (6282-6286) via an east-west flue at ground level (6398) at the southern end (2.230). The hot air

circulating through the flues left via a further east-west raised flue at the northern end (6397) that exits through an above-ground flue (6399) to Chimney 2 to the north (2.231). The main north-south flues were around 0.80m wide and 0.50-0.60m tall and constructed of a single skin of hand-made yellow or red bricks, laid in Stretcher bond. They were covered in a series of corroded ferrous metal plates (6400-6406) that pre-dominantly survived at the northern end of the stove house. The southern east-west flue 6398 was covered by a series of 12 ferrous metal plates (6407, 2.230) that had partially collapsed or been displaced but acted as a walkway. The ditches between each flue had filled with compacted layers of salt (6408-6412). The westernmost of the ditches retained a fragmentary surface of hand-made red brick laid on-edge in Stretcher bond (6413; 2.232).



2.230: Stove House 4, interior flue level, southern flue run, east facing



2.228: Stove House 4, interior flue level, east facing



2.231: Stove House 4, interior flue level, north-west facing



2.229: Stove House 4, interior flue level, north facing



2.232: Stove House 4, interior flue level, brick floor surface, south facing

The first floor was supported by a series of east-west ferrous metal I-beams, which were re-used former rail lines (6333-6339; BS046). A single wooden joist rested on top of these and the north-south floor boards were above these. Each beam was supported by three cast-iron columns, in an even spaced plan, making a total of 21 columns (5104, 5109, 5110 all now displaced and stored; 6372-6389). These were of a circular cross-section varying in diameter from 4½", 5½" and 7" wide, with a circular base and a trenched support acting as the principal. At the northern end a series of six, vertical ferrous-metal I-beams and two massive wooden trimmers (6416) support the weight of Crushing Mill 2 above.

The floor boards of the warehouse level (6332; 2.233, 2.234) were of soft wood, 9" wide and 2.5-3" thick, with a ferrous metal fillet in-between each board. They narrowed to 6" wide on the outer six to seven boards (like Stove House 3) but most of these had decayed or been removed. Within the floor boards were a series of twelve salt-traps (6360-6371; e.g. 2.235), designed for 'lumping' the salt to the warehouse floor above. These were open rectangular holes, c. 1.0 x 1.1m in size, supported by trimmers on northern and southern sides. Each salt-trap had either two thick plank hatches or a series of five or six planks by which they were covered and closed. These have been largely removed or are labelled and stored (e.g. 5120-5127).



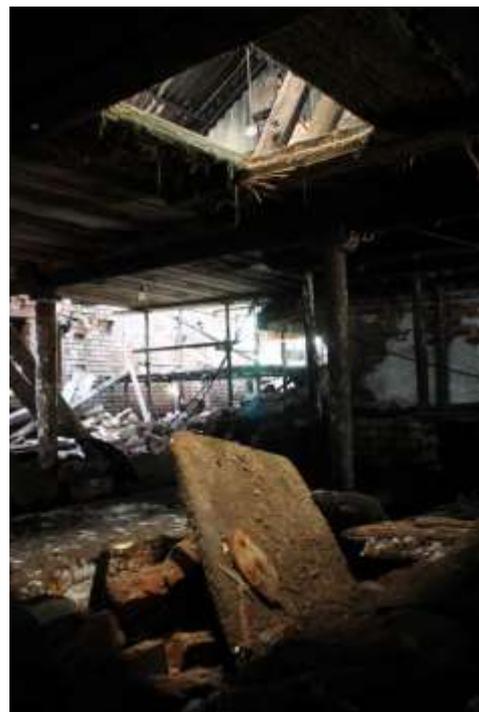
2.233: Stove House 4, interior warehouse level, north facing

The warehouse level is open to roof level. At the southern end with the gable cladding removed to allow clear visibility to Pan House 4 (2.234). Access

routes gave to the west to Stove House 3 warehouse level (6121; see SH3 above), to the north via an open wide doorway (6358) to the Packing Area and to the west to the Loading Bay walkway (6304; see above).



2.234: Stove House 4, interior warehouse level, south facing



2.235: Stove House 4, interior flue level, salt hatch, north facing

The roof is supported by an L-form ferrous metal framework that consists of a series of seven aisle trusses (BS040, BS046; 2.233, 2.234). Seven aisle posts on either side (west 6309-6310, east 6348-6354) are formed of vertical I-beams. These support I-beam principal rafters, which rest on inserted concrete blocks at eave level. The upper trusses are formed of an L-form ferrous metal in a

King Post design, with aisle ties of metal rods under tension. Six trusses exist (6318-6323). Between the second and third trusses from the south are wind braces (6326, 6347). Between the fifth and final (sixth) truss is a large louver, with pitched corrugated cement asbestos roof and two louver windows on either side (6308). The northern end is dominated by two crushing mills, Crushing Mill 1 and 2 (6329, see Section 5.1 for a detailed description).

Phased Interpretation

Phase 2-4: No discernible elements of the Red Lion Inn can be seen in the fabric of Stove House 4.

Phase 5-6: The shared wall with Stove House 3 dates to c. 1900. With its redundant window openings the wall shows that the location of Stove House 4 was originally open space before the two fishery pans were built. There was no evidence for the fishery pans in the current structure of Stove House 4.

Phase 7: The construction of Stove House 4 appears to entirely date to the 1950s. It is not entirely clear if the date of the metal roof (given as 1956, see above) was the original date of construction, but it does appear likely. The use of a metal framework was unique amongst all the warehouses undoubtedly due to the corrosive effects of salt on the metal. Its construction almost certainly dates to a period when all the previous four common fishery pans had been demolished and replaced by the current Pan and Stove House 4 complex. This suggests a change in emphasis from lower grade common salt to fine salt within the works. In form and function the stove house was almost identical to Stove House 3 (see above for interpretation). It was however, better connected via the exterior walkway to the north-east and the packing area to the other areas of the works.

Phase 8-9: Little alteration has occurred to Stove House 4 since the acquisition of the salt works by Vale Royal Borough.

3. PAN AND STOVE HOUSE 5

3.1 PAN HOUSE 5

Historical Background

Pan House 5 was built after 1965 contemporary with Stove House 5 as part of a stand-alone pan and stove complex. The design of Pan House 5 is similar to the surviving remains of Pan House 4 and it is likely that it provided the inspiration for much of the technical design for the construction of the pan house.

Pan House 5 was one of the poorest preserved monuments on site and had seen considerable deterioration in the last 25 years. Historic photos allow reconstruction of its form prior to collapse (see 3.1, 3.2). The best of these reveal it as it was originally constructed. It was a hipped roof structure in common with other pan houses of the Lion Salt Works.



3.1: Pan House 5, 1970s, prior to conversion to oil, north-west facing



3.2: Pan House 5, 1990, prior to collapse, north facing

The principal façade faced east (3.1). It is shown as being originally open to allow access to the kiln and furnaces when first built (3.1). The walls were

of stud wall construction with vertical planking on the eastern elevation. Two single doorways on either side of the elevation gave access to the hurdle walkways. The main area of the ground floor as previously discussed was entirely open. A second first floor doorway was visible on the northern side of the eastern elevation. It was subsequently enclosed (3.3) with a low brick-built sill wall and a stud wall and corrugated iron sheet caboose built above that provided covered access to the stoves and protected the oil pipes.



3.3: Pan House 5, 1986, south-west facing

The southern (see 3.2) and northern (see 3.3) elevations were similar and were made of a low hand-made red brick stud wall (described below, surviving in 2009 but now removed). Above this the barricade was constructed of vertical studs running the full height of the building. These were covered with horizontal planks in common with the design of other pan houses on the site. The southern elevation had a single doorway at ground floor level, a second doorway at first floor level and two plain windows. The northern elevation had a single doorway opening at ground floor level. A doorway at the western end at first floor level and partially constructed steps for access are also visible. No windows are visible.

The roof structure was hipped at the eastern end and covered in corrugated ferrous metal. The upper element to the apex of the roof was open to allow steam to escape. Internal images (3.5) reveal that the roof was supported on a series of wood roof trusses of king post design with a series of two raking struts either side. On either side these supported six sets of staggered purlins (three to each set minimum).

The structure began to collapse in the 1990s. It was intact in 1990 (see 3.2) but was poorly preserved by 1995 with the structure only partially surviving (see 3.4).



3.4: Pan House 5, during collapse in 1995, north facing



3.7: Pan House 5, prior to enabling work in 2009, south facing



3.5: Pan House 5, interior 1990s, north-west facing

The pan was placed centrally and is described below. Either side were a series of wooden walkways above the hurdles. An image from the 1990s shows the collapsed state of the walkway and caboose (3.6).

It was dismantled as part of the 2009 enabling works and this report forms a description of the pan complex prior to its dismantling (see 3.7, 3.8, 3.9, 3.10 for images of the state of decay by 2009).



3.8: Pan House 5, southern hurdles, prior to enabling work in 2009, east facing



3.6: Pan House 4, after collapse in 1997, south-east facing



3.9: Pan House 5, northern hurdles, prior to enabling work 2009, east facing



3.10: Pan House 5, southern hurdles, during enabling work 2009, west facing



3.13: Pan House 5, oil firing system as visible in front of pan, south facing

Description

Pan House 5 was aligned east-west to the east of associated Stove House 5. None of the original fabric of the barricading, frontage or roof structure survived (BS078). Of the surviving pan houses it was in the poorest condition.



3.11: Pan House 5, stove, eastern elevation



3.14: Pan House 5, brine pipe to pan and remains of internal lathe wall, note wooden cover to brine pipe, north-west facing



3.12: Pan House 5, remains of oil firing system for the pan house, north facing

The stove survived in a poor condition. The principal eastern elevation was constructed in hand-made red brick in English Garden Wall bond, the absence of mortar suggesting it was salt or clinker based and had decayed (BS080, 3.11). A series of four openings without stove doors allowed access to the flues beneath the pan. Each of the openings was oil fired as part of the latest phase of fuel development (3.12, 3.13). These were served by a series of three ferrous metal pipes which attached to valves at the openings. The cast-iron brine pipe to feed the pan survived in situ (3.14). It was vertical, about 7" in diameter and turned level with the pan to empty over it. At the time of recording it was free-standing positioned c. 0.5m from the pan and the upper edge was resting against the edge of the pan.

The southern elevation of the stove (BS079, 3.15, 3.16) was collapsed or partially collapsed hand-

made red brick bonded with a mix of headers and stretchers that had no pattern. No mortar was discernible between the bricks and had clearly corroded away due to exposure to salt. Two large brick piers retained the wall and were built over the remains of a wide machine-cut brick lined drain that ran down the eastern edge of the stove.



3.15: Pan House 5, stove, southern elevation



3.16: Pan House 5, stove, south elevation, east facing

The timber structure of the southern hurdles only partially survived. The majority was removed during enabling works. This included the hurdle walkway of 3" thick timber boards (see 3.10). The scantling and framework of north-south joists had collapsed and was laid at an angle (3.17). In turn a wooden framework supported this. It consisted of two east-west aligned sill beams and a series of vertical posts mortice and tenon jointed into them (see 3.15, 3.16, 3.18). To the west (beyond the first brick pier) were four posts, centrally (between the two brick piers) were a further five posts and to the east were a further two posts (east of the final brick pier).



3.17: Pan House 5, stove, southern hurdles, east facing



3.18: Pan House 5, ditch, southern hurdles, east facing



3.19: Pan House 5, ditch and southern hurdles, during dismantling of sill wall, north-east facing

The archaeological remains of the barricades on the southern side were represented by the sill wall of hand-made red brick in English Garden Wall bond (3.19, 3.20). This survived to a height of c. 0.8m in height. A series of steps built in hand-made red brick ran east-west and would originally

have accessed the gangway of the hurdles (3.21, 3.22). None of the timber work survived.



3.20: Pan House 5, pan, ditch and southern hurdles, north-east facing

The base of the hurdles consisted of hand-made red brick ditch skimmed with concrete. It sloped from east to west and was sloped on northern and southern sides. It drained at the south-east corner via a ceramic pipe into a square brick-lined sump located outside the pan house footprint (3.23, 3.24).

The northern elevation of the stove was in much poorer condition than the southern (BS081, 3.25, 3.26). It survived best at the front of the pan where it was visible constructed in hand-made red brick in Stretcher bond. The central and western section had almost entirely degraded or collapsed and was visible only as fragmentary bricks with no discernible mortar. The northern side of the stove, was retained by two large brick piers like the southern side. This overlay the remains of a wide brick drain, skimmed with concrete as before (3.27). It likewise sloped west to east and drained via a ceramic drain to the east. It is not clear where this drain passed from here but it is anticipated that it turned to the south to exit into the sump described above.

The sill wall of the barricades survived to its full height of c. 0.6-0.8m, but had collapsed elsewhere (see 3.25, 3.26, 3.27). The timber structural elements of the northern hurdle survived collapsed in situ. These were removed during enabling works (3.28). They consisted of 3" thick timber planks of the walkway and the north-south joists of the underlying walkway. They were

supported by the collapsed element of the western central sill beam and a series of posts that had collapsed.



3.21: Pan House 5, steps to southern hurdle walkway, south facing



3.22: Pan House 5, steps, hurdle ditch and associated sump



3.23: Pan House 5, southern ditch and associated sump



3.24: Pan House 5, southern ditch and hurdles, west facing



3.27: Pan House 5, northern ditch, west facing



3.28: Pan House 5, northern hurdles and walkway during dismantling, west facing



3.25: Pan House 5, stove elevation north and ditch, south-east facing



3.29: Pan House 5, caboose at eastern end of pan, north facing

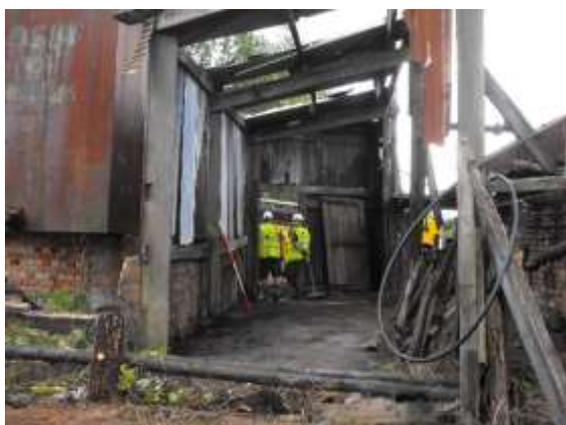


3.26: Pan House 5, stove elevation north and ditch, west facing

At the eastern end was the remains of the caboose (see 3.29, 3.30, 3.31). This two-storey high

structure covered the front (eastern) end of the stove and pan. It consisted of a low hand-made red brick sill wall. Above this was a wooden box-frame wall covered in corrugated ferrous metal sheets. The roof of corrugated metal sheets sloped east to west and formed the hipped element of the pan house. A single doorway exited the caboose to the south-east.

To the east of the caboose were the remains of a ferrous metal rectangular oil tank, which rested on a brick and concrete base (see 3.31). The concrete base survives in situ. On the side of the oil tank graffiti had been scrawled 'closed for work'.



3.30: Pan House 5, caboose at eastern end of pan, south facing



3.31: Pan House 5, caboose at eastern end of pan, during dismantling, south facing

A series of four central flues ran beneath the pan east-west (BS078). Each flue was c. 0.8m wide. At either side, south and north, of the stove were two narrower flues (making six in total). These were the dead draft (i.e. they received no direct heat) and were narrower c. 0.4m in width. All the walls

of flues were two skins thick and constructed of hand-made yellow 'refractory style' brick in English Garden Wall bond (3.32, 3.33). The space between the outer flues and the stove wall, the dead draft, was filled with a mix of ash and clinker visible in the collapsing sections of the outer wall.



3.32: Pan House 5, stove, flues after excavation, east facing



3.33: Pan House 5, stove, flue distribution showing openings, east facing

The flues continued from under the pan west where they ran under the 'back-end' of the pan (i.e. the area at the very rear of the pan). From here they continued beneath the eastern wall of Stove House 5. The flues altered here to form a series of four flues with two walls in pairs between the central flues. The change in direction was visible on the wall footprint (see 3.32). The walls were two skins thick and constructed of hand-made yellow 'refractory style' brick with a caulk between of red loamy sand. The flues were

covered by a series of eight flue plates of 3/8" thick ferrous metal (see 3.34, 3.35, 3.36). From here the flues entered Stove House 5 via four openings with thick ferrous metal plates that carried the weight of the eastern wall of Stove House 5. From there they connected to the north-south cross flue at the eastern end of Stove House 5.



3.34: Pan House 5, stove, flue connection, north facing



3.35: Pan House 5, ferrous metal covers of the exit flues, south-east facing



3.36: Pan House 5, remains of four exit flues, north facing

The pan itself survives and is currently placed on scaffold and is due to be placed back in the location of the pan house after restoration (in 2014, 3.37, 3.38). It was originally aligned east-west and set on top of the stove. It was 12.60m (east-west) by 7.60m (north-south) with a rim height of 0.45m.



3.37: Pan 5 during lifting, west facing



3.38: Pan 5, during lifting with inserted ferrous metal girders, south-east facing

The pan was made of a series of c. 50 ferrous metal plates riveted and welded together in a similar manner to the pans already discussed above (see Pan House 3, Pan House 4, 3.39, 3.40). These are more frequent and smaller towards the front of the pan where heat was greater and in direct contact with the pan. The rivets were 25mm (1") in diameter and spaced at a distance of 50mm (2") apart. In the very south-west corner was a square hole 75mm (3") in diameter (see 3.41, 3.42). The hole was designed for draining the pan and was covered with a 'cotter patch'. The sides of the pan (the rim plates) were angled at an obtuse angle of c. 100° from the horizontal and riveted and welded to the base of the pan. They were

welded to the base of the pan by means of a ferrous metal angle. The corners were likewise riveted and welded together. Along each side of the pan were a series of two ferrous metal rings riveted to the rim plates of the pan by means of a small square plate. The rings were 180mm long and 90mm wide, and contained a second chain of the same size. These were designed for lifting the pan by means of a jigger rig (see Pan House 3 above for description). The pan was filled by a layer of encrusted salt residues (salt or pan scale).

During the restoration process the pan was lifted into its current location (2009-2014). The salt scale was cleaned from the interior of the pan and the pan was treated to prevent decay (3.43, 3.44).



3.41: Pan 5, cotter-hole for draining pan, note cotter patch on edge of pan



3.39: Pan 5, base during lifting



3.42: Pan 5, cotter-hole after cleaning



3.40: Pan 5, base during lifting



3.43: Pan 5, on scaffold during cleaning of interior salt residues, north facing



3.44: Pan 5, after cleaning, north facing

Phased Interpretation

Phase 7: The construction of Pan House 5 occurred in 1965 and although some alteration had occurred it remained in its current state until its eventual collapse in the 1990s. The use of oil within the stove appears to be contemporary with Pan House 4. It used similar technology to this pan house but a much smaller oil tank. This had seen a notable deterioration of the eastern end of the pan where continual patching of the pan was visible with welded and replaced pan plates.

The design of Pan House 5 clearly displayed similarities to Pan House 4 and appeared to represent the final genesis of the pan house on site. Its use of an oil fired system, its layout of flues and plates and hurdle design as visible all appear to be similar if not identical to Pan House 4 as it originally looked in the 1950s (prior to the addition of the new roof and lean-to structure at the front).

Phase 8: The pan house gradually collapsed throughout the 1990s after the acquisition of the site by Vale Royal Borough. The most notable period of deterioration occurred between 1995 and 1997 when almost the entire wooden structure collapsed.

Phase 9: The pan house was almost entirely dismantled during the 2009 enabling works

3.2 STOVE HOUSE 5

Historic Background

This was constructed in or just after 1965, when planning consent was received for its construction. The flue level plan is depicted in a number of planning drawings housed at the Weaver Hall Museum (see 3.45). A photograph of 1965 shows Henry Lloyd Thompson as a young man stood outside the half-built stove house with wooden frames of the roof panels adjacent (see 3.46).



3.45: Stove House 5, building plan c. 1965



3.46: Stove House 5, Henry Lloyd Thompson during construction

It is first visible on the 1970 Ordnance Survey map and is subsequently visible on aerial photographs from 1973 and 1985. The stove house had collapsed and the pan itself was supported upon a

box scaffold during 2009. The stove house structure was tagged, dismantled, and stored away for re-erection, during the 2009 enabling works programme.



3.47: Stove House 5, after the collapse of Pan House 5 in 1997, north facing



3.48: Stove House 5 in the 1990s, south facing



3.49: Stove House 5, collapse in wall, 1997, north-west facing

The stove house began to deteriorate around the same time as Pan House 5. Notably a large collapse of the south-eastern corner of the stove house occurred prior to 1997 (see 3.47).

The form of the stove house however, remained intact until its dismantling in 2009. It is visible in a number of photos from the 1990s (3.48, 3.49). The interior was used for salt drying at the flue level. Whilst images show that the upper area was extensively used for packing of salt (see 3.50).



3.50: Stove House 5, salt packing demonstration in the 1970s

Description

The stove house was aligned east-west with the pan house located to the east (BS082, BS083, 3.51). It was the only stove and pan complex built on site that was free-standing and outside the complex of the historic core. It was a two-and-a-half storey building built in hand-made red/ yellow brick in English Garden Wall bond throughout its four elevations.



3.51: Stove House 5, during enabling works, north-west facing

Exterior

The principal elevation faced east towards the pan house (BS091; 3.52). It was gabled and built in hand-made red/ yellow brick in the English Garden Wall bond to above the second floor level (about c. 1m above the level of the warehouse floor). This was carried up through the gable in a wooden stud wall clad in vertical planks that had been felted underneath. The remnants of the gable of Pan House 5 were visible against the exterior wall as a line of surviving rafters. Two openings survived from the original access between Pan and Stove House 5 at first floor level. These were located equidistant apart at first floor level in line with the original location of Pan House 5 hurdles. They had substantial wooden posts and wooden lintels above. The doors had been removed. Two further openings to allow light existed in the warehouse level of the wooden gable. The south-eastern corner of the Stove House had collapsed and a large fissure existed on the eastern elevation.



3.52: Stove House 5, eastern elevation



3.53: Stove House 5, southern elevation, north-west facing

The southern elevation was entirely built in hand-made yellow/ red brick as above (BS090; 3.53). It was reinforced by a series of six vertical ferrous metal I-beams reused from railway lines that tied into the horizontal beams that supported the warehouse level floor. The joint was made via a bolt through both members at their end. The elevation had a single central window opening. This was originally a wooden casement window (visible on historic photos) but had subsequently been bricked up.

The northern elevation (BS092; 3.54) was almost identical to the southern elevation and again adopted the system of six vertical I-beams to reinforce the wall, whilst tying the horizontal beams into the structure as a whole. Two windows were located in the northern elevation.



3.54: Stove House 5, northern elevation



3.55: Stove House 5, entrance to warehouse via walkway, east facing



3.56: Stove House 5, western elevation and walkway, north facing

The western elevation was gabled as before (BS089; 3.55, 3.56). It was constructed in hand-made red/ yellow brick as above to the eave level. The gable was carried up in a stud wall covered in vertical planks that were felted underneath. A single wide doorway was located at warehouse floor level that continued to the east as the wooden walkway to the packing area (to be described in subsequent reports). The doorway had thick wooden posts and a wooden lintel. The door had been removed.



3.57: Stove House 5, roof, east facing

The roof was pitched, with wooden panels underneath and covered in corrugated cement asbestos. Cement asbestos and wood weather boards covered either gable (BS084; 3.57, 3.58, 3.59). The roof had been altered and a series of eight corrugated plastic sheets had been inserted to act as skylights. Set in the apex of the roof was a louver c. 1m in height with wooden sides and a corrugated cement asbestos roof. Rising from both the eastern and western apex was a square cross-

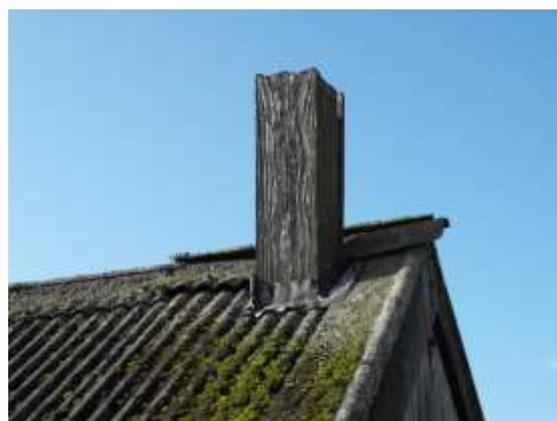
section wooden ventilation tube that extended down through the building to flue level (see 3.60).



3.58: Stove House 5, roof, south facing



3.59: Stove House 5, northern elevation, during enabling works



3.60: Stove House 5, detail of ventilation tube

Interior - Flue Level (Ground and First Floor)

The interior of Stove House was set over two levels; the lower flue level and the warehouse level. The flue level was at first floor level at the same height as the pan in Pan House 5 (BS082, see

above). This was in order to allow the space beneath the floors and allow access between the pan and the flues of the stove house.



3.61: Stove House 5, excavation of flue infill material by machine, west facing



3.62: Stove House 5, remains of southern wall with ferrous metal I-beam support, north-east facing

The construction of the stove house was clearly demonstrated during the dismantling of Stove House 5 (3.61, 3.62). The four exterior walls of the stove house formed a shell of hand-made red brick. They were built on a layer of concrete laid in foundation trenches at a depth of c. 0.8-1.0m below ground level. At the base the brick wall was corbelled on the exterior to three-skins thick, decreasing to two skins thick at ground level. The walls were reinforced with the series of vertical ferrous metal I-beams from reused rails (described

below, see 3.63) to below ground level. The beams were set in concrete plinths at their bases. The interior space between the foundations was subsequently filled with a thick layer of black clinker ash material to a depth of c. 1.75m (see 3.64). Occasional longitudinal-walls were visible uncovered during the watching brief when the layer was machine-excavated. These may have supported the flue walls or more probably the line of columns above.



3.63: Stove House 5, dismantling the southern wall of Stove House 5, south-east facing



3.64: Stove House 5, remains of the northern wall and foundation base, build-up of ash in interior, west facing

The flues of the stove house were built on top of this layer. Eight longitudinal flues ran east-west with end flues running along the line of the

eastern and western gables (BS084; 3.65, 3.66). The flue walls were built of hand-made yellow 'stock-type' bricks in Stretcher bond. They stood c. 0.4m above the ditches, but were c. 1.6m in total depth. They were topped with ferrous metal plates throughout. These had hooks hanging from beneath them in places. The flues at the southern and northern wall were built against the side walls with a rough layer of fire damaged yellow stock bricks sandwiching a layer of ash clinker beside the wall (see 3.67, 3.68, 3.69).



3.65: Stove House 5, flue level, east facing during dismantling work



3.66: Stove House 5, flue level, north facing during dismantling work

Between the flues were a series of ditches. These were filled with a thick layer of clinker ash material, continuing from the layers below (3.70). A thin (100mm) layer of salt formed the bed for a brick floor surface which was the base of the ditches.



3.67: Stove House 5, flue level, southern flue, south-west facing



3.68: Stove House 5, southern flue, west facing



3.69: Stove House 5, southern flue detail of covering plate, west facing



3.70: Stove House 5, detail of flue openings from eastern north-south flue, west facing



3.71: Stove House 5, eastern north-south flue, south facing

The flue along the eastern gable was lower than the others and had a series of four openings to the east that led from the stove in Pan House 5 (3.71, 3.72). The four low openings ran under the gable wall and had ferrous metal lintels above. It was lower than the remaining flues and was covered with a series of plates that acted as the walkway at the western end of the stove house. Small letter-box openings set low in the ends of the eight east-west flues connected them to the eastern gable flue.

The western gable flue connected directly to the eight main east-west flues. It was of similar design to the side flues with large metal plates resting on the interior walls to the east and a single brick

corbel to the west. It ran north-south along the length of the wall and continued to the south outside the exterior of the stove house. The flue extended c. 20m south towards Chimney 3 that originally served the fishery salt pans of Phase 6 and later the steam engine for the brine pump.



3.72: Stove House 5, east-west flue detail



3.73: Stove House 5, the over-ground flue and damper plate during demolition, north-east facing



3.74: Stove House 5, the over-ground flue and damper plate during dismantling, north facing

At the south-western corner of the southern elevation the flues exited and continued to the south via an over-ground flue that connected to Chimney 3 (BS082, BS090; 3.73, 3.74). This consisted of a number of hand-made yellow brick bases, between which were set a series of two I-beam rails. On these were built ferrous metal plates, a skin lining on either side and capped with further ferrous metal plates. The flow of air was controlled by a damper plate connected to the southern elevation. The speed of air flow was aided by a large electric fan set at the south-western corner of Stove House 5.

Interior - Warehouse Level (Second Floor)

The warehouse floor was supported on a series of six north-south transverse ferrous metal I-beams re-used from rail lines (visible on 3.65, 3.66, 3.75). These were supported at either end by the southern and northern walls and the exterior I-beams as discussed above. On the interior four I-beam rails had been converted into columns by the addition of a rectangular trenched capital to accept the horizontal beam. These were evenly spaced across the width of the stove house and positioned in the ditches of the flues.



3.75: Stove House 5, warehouse floor during dismantling, south-east facing

Running along the top of each transverse beam was a wooden beam. The floorboards were laid perpendicular to the beams and consisted of a series of 9" wide floor boards, 3" in depth with a fillet of ferrous metal between each board. The boards became marginally narrower towards the edges of the room where there were only 6" in diameter. A total of 22 salt traps were set equidistant in a geometric pattern throughout the

floor (3.76, 3.77). The traps were roughly square and c. 0.80m in diameter. The covers for the salt hatches had been removed and were absent.



3.76: Stove House 5, salt traps set within the warehouse floor, east facing



3.77: Stove House 5, warehouse floor, north-east facing

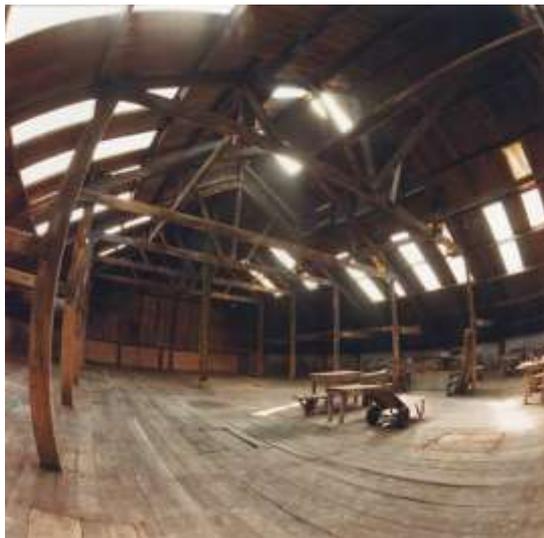


3.78: Stove House 5, sliding door to walkway, north-west facing

The main plan of the warehouse level was open with an entrance from the west via the walkway from the packing area. Historic photos show a slide

door mounted on a rail originally existed to close the entrance (3.78).

The roof structure was aisled in a simple plain manner (BS084, BS093; 3.79, 3.80, 3.81). This consisted of six aisle rafters which were supported on either side by the wall, six wall posts and a row of six aisle posts. The wall and aisle posts were mortise and tenon jointed into the floor boards.



3.79: Stove House 5, interior warehouse level, east facing



3.80: Stove House 5, interior warehouse level, east facing

The rafters were braced with a tie beam, king post and raking struts at the top of the aisle posts and aisle ties from the posts to the wall plates (BS093; 3.81). The rafters were half lap jointed at the apex with wood dowel and bridle jointed into the posts at the wall. A simple metal plate strengthened the lap joint between the aisle posts and the rafters (3.82).



3.81: Stove House 5, interior, truss details



3.82: Stove House 5, interior, aisle post and rafter detail



3.83: Stove House 5, staggered purlins with louver in background

A series of six staggered purlins (each of three parts) ran along the length of the roof (3.83). These were supported by a simple cleat reinforced on the upper side by a ferrous metal angle (3.84). The central apex of the roof structure had a simple ventilation louver with louver windows either side allowed air to vent from the warehouse (3.85). The roof structure was covered with a layer of

softwood planks prior to covering with corrugated asbestos cement (3.86).



3.84: Stove House 5, clasped purlin and plate securing



3.85: Stove House 5, louver of the roof from the interior



3.86: Stove House 5, louver and softwood cladding of the roof

Phased Interpretation

Phase 7: The entirety of the Stove House 5 complex belongs to Phase 5 of the works. It was built in 1965 by Henry Lloyd Thompson. The Stove

House appears to have represented the culmination of the development of Stove House building. It was wider than the other stove houses allowing nine flues to be used as opposed to seven elsewhere. The use of an over-ground flue allowed Chimney 3 to be continued to be used. It previously served the fishery salt pans.

At warehouse level a much more even distribution of salt traps has been used to aid lofting of the salt lumps. Historic photos suggest the warehouse was also used for packing and formed part of the 1970s museum experience. The simple layout does not appear to have otherwise changed in its lifetime.

The process does not appear to have been any different in principal to those practiced in Stove House 3 and 4 from earlier phases of the works. The only major variation appears to have been the adaptation of the over-ground flue supplemented by an electric fan. This was part adaptation of an earlier chimney and part innovation to improve air flow through the flues. The damper plate revealed how air was controlled and affected the drying process in the stove house. The presence of two square section ventilation tubes also reveals how air temperature was closely controlled.

Phase 8: This should be seen as a stage which saw deterioration of the stove house. Partly this was due to the temporary nature of the construction, but also the deterioration of ferrous metal elements of the stove during its lifetime. In particular metal I-beams inserted in the walls to carry flues and subject to both the effects of salt and heat erosion have caused elements to collapse. This is particularly apparent in the eastern elevation where the fissure opened in the south-east wall. This was a common feature of stove houses and suggests that integral structural instability of the structures here (see also Stove House 4 where the corner is reinforced with ferrous metal beams). The collapse of Pan House 5 cannot have aided structural stability.

Phase 9: The stove house was dismantled as part of the 2009 enabling works.

4. PERIPHERAL BUILDINGS

4.1 RED LION INN

Historic Background

This front range of the building was built as a pair of cottages in 1877. These were one of two double cottages with a further two subsequently demolished to the south. Between 1898 and 1910 as shown on the 3rd edition Ordnance Survey map of 1910 it was converted to become the Red Lion Inn. Architect drawings survive showing the conversion of the dwellings into the Red Lion Inn.⁶⁴ The cottages had plain façades with semi-circular arched doorways set to one side. To one side was a covered side passage to the rear where a short extension passed to the rear. This pattern of cottage arrangement can be seen elsewhere in the village of Marston and appears to be indicative of speculative cottages built for salt workers.

The conversion to the Red Lion Inn involved the ground floor becoming a series of parlours and snugs. The rear wing was added at this time. It was used as a pantry, scullery and kitchen with a beer cellar and stable with three stalls to the rear for canal boat horses. In 1940 the building became used as a lodging house. In 1950 they were subsequently used as the office and bag store for the Lion Salt Works.⁶⁵



4.1: Red Lion Inn, west elevation, 1980s

Between 1987 and 1989 it was refurbished by Vale Royal Borough Council and the Groundwork Trust. The refurbished buildings can be seen in 4.1, 4.2, 4.3, 4.4.

⁶⁴ See Volume II, 3.63

⁶⁵ Fielding 2000, 31



4.2: Red Lion Inn, west elevation, 1980s, north-east facing



4.3: Red Lion Inn, south facing elevation, 1980s



4.4: Red Lion Inn, repairs in the 1980s, east facing

Description

Row of two two-storey terraced houses converted to a public house with a later two-storey extension to the rear.

Exterior

The principal elevation (5008) of two bays faces west onto Ollershaw Lane (BS129; 4.5). The original front range was constructed in hand-made red brick in Flemish bond with repointed cement mortar. There are two bays of windows symmetrically placed on either side with plain

cement heads, sills and splayed jambs. They contain four-pane sashes. A single doorway with a semi-circular arch survives with the original fanlight above; the door has been replaced. A further doorway probably existed to the north but has been replaced by an attached porch (5009). The eaves are of decorated terracotta. A ceramic date-plaque is centrally placed with the date inscription '1877'. The remains of the fitting for the attached pub sign are visible at first floor level. The pitched roof (5010) was a later (post-1986) replacement of grey slate, with lead shutters and ceramic roof tiles.



4.5: Red Lion Inn, north-east facing

The porch (5009) has a wooden stud-wall arrangement with inserted brick-nogging mimicking the arts and crafts style. The main entrance was from the north with wooden casement windows on the western and southern elevations. The pitched roof is of grey slate.

The southern and northern elevations are gabled. The southern elevation (5000; BS130; 4.5) is built in hand-made red brick in a mixed bond of English Garden Wall style. The brick quality is poor, heavily degraded and cracked and consists of seconds with repointed cement mortar. The eaves are plain. The northern elevation (5007, BS130; 4.6) is constructed of hand-made red brick in English Garden Wall bond. Two small central windows are located at ground and first floor with segmental heads and plain wooden casement windows. A single inserted doorway has been placed on the ground floor, with a plain soldier head in brick and a plank and baton door.



4.6: Red Lion Inn, northern gable, south-west facing

The original rear elevation had two bays (5001, 5006) constructed in hand-made red brick in English Garden Wall bond. The southern bay (5001) had two windows on ground and first floor with plain cement heads and sills, and a four-pane sash. The northern bay (5006) was identical.

The two-storey rear range consisted of five bays extending to the east (BS130, BS131, BS132; 4.7, 4.8, 4.9). It was constructed in hand-made red brick in English Garden Wall bond, originally with lime mortar but largely replaced with cement resulting in intermittent water damage. The southern elevation (5002, Plate 6.7.8) had five bays, arranged in a pattern of a single bay to the west and four to the east reflecting the internal plan layout. The single bay to the west has windows on ground and first floor; the bays to the east had a single window and doorway at ground level with four evenly spaced windows on the first floor. The single door with fire-glass surround was a later replacement of a possible earlier double door. All the windows have segmental arched heads, plain sills and four-pane sashes.



4.7: Red Lion Inn, southern elevation, rear wing, north-west facing



4.8: Red Lion Inn, eastern gable, rear wing, north facing



4.9: Red Lion Inn, northern elevation, rear wing, south facing

The northern elevation (5005) was staggered in plan (BS130; 4.9). Elements of an earlier rear range

that was contemporary with the front range, had been incorporated into the rear range of the building for a length of c. 2.5m. This was visible as a slight change in the size and style of the brickwork in the initial element of the staggered range suggesting that the original rear range was a single storey in height of which only the one elevation survives. The northern elevation was similar in design to the southern elevation. The western bays were plain at ground floor level but a plain doorway had been inserted into the brickwork. Two windows with segmental arched heads and plain sills were located at first floor level. The westernmost was smaller reflecting the internal layout (this is now a toilet). The eastern part of the northern elevation had a single doorway at ground floor level and a small segmental arched casement window. The doorway had a plain sandstone sill. Three bays of two windows and a first floor doorway exist at first floor level. All have segmental arched heads and plain sills, with four-pane sash windows. The centre of the elevation is dominated by an external wooden stairway with a lantern porch leading from the ground to the first floor which appears to be a later replacement in the original location.

The rear gable end (eastern; 5003; BS131; 4.8) of the rear elevation is likewise constructed in hand-made red brick in English Garden Wall bond with repointed cement mortar. A centrally placed chimney stack dominates the gable end; the stack is arched at ground floor level; the pots have been removed. Either side of the stack are two inserted doorways. The southern doorway has a lintel made of recycled ferrous metal, which appears to be a spacer from the metal plates that cover the flues in the stove houses. The northern doorway in contrast has a plain wooden lintel. These doorways lead to the exterior toilet blocks (5018). A plain c. 2m high wall of machine-cut red brick in English Garden wall bond (5004) has been inserted to obscure the toilet block c. 1.2m to the east.

Interior

The interior of the building is split into two parts: the front range, which formed the original terraced cottages and the rear range which was a later extension (BS126, BS127).

The front range

The ground floor had been extensively altered to accommodate the conversion to a public house. The current plan consists of a central staggered corridor leading from the front, western entrance and hall (5012, Room 2; 4.10) towards a corridor (5014, Room 5; 4.11) to the rear via a dog-leg. The entrance hall (5012) replaced an original open room to the south with an inserted wall. The dog-leg was a later redesigned feature of the layout to accommodate a straight stairwell to the first floor (5023), that turned north on the landing. The corridor (5014) was plain with a single doorway to the north to room (5015) and a door to the rear block.



4.10: Red Lion Inn, ground floor, Room 2, west facing

Leading to the south from hall (5012) was a door onto a side room (5013, Room 3; 4.12). This was originally two rooms, with a central partition now removed. The walls were plastered and whitewashed. Exterior lighting was provided by windows to the east and west (described above). Both of the original room layouts is served by a chimney stack and hearth.

To the north was a small room (5011, Room 1; 4.13) with a chimney breast on the northern wall. The eastern wall originally had a central doorway to the adjacent eastern room (5015) that had been subsequently blocked. Within the room were a

series of late-20th century fitted cupboards. No original features survived.



4.11: Red Lion Inn, ground floor, Room 5, west facing



4.12: Red Lion Inn, ground floor, Room 3, west facing



4.13: Red Lion Inn, ground floor, Room 1, east facing

The room (5015, Room 5; 4.14) that led north of corridor (5014) had been drastically altered, contemporary with the conversion to the public house. A doorway had been inserted to provide a further exit to the north. The room had been subsequently sub-divided into three parts: a scullery on the western half, a washroom to the south-west and two toilet blocks. The sub-division was either a later element of the Red Lion Inn or contemporary with the conversion to a museum.



4.14: Red Lion Inn, ground floor, Room 5, north facing

The first floor is open plan as a result of alteration by Vale Royal Borough in 1987-1989. Originally it composed four rooms set around one (or two) central stairwells. The north-west of these rooms (5019, Room 8a; 4.15) is open plan, to south and east. An original chimney-breast is located on the northern wall. Light is provided by windows to the west and north. The bracing for the public house sign is visible on the western wall. To the east was a second room (5020, Room 8b; 4.16), likewise opened out to the west. The original wall between these two rooms partially survives with a wide open doorway. An original chimney breast is on the northern wall and light is provided by a window to the east. The entrance to the room has an inserted fire-glass door and partition wall. Another fire-glass partition wall has been inserted in the stairwell to provide light. A third room (5021, Room 8c; 4.16), south of room 5019 completes the open plan element of the first floor.

The partition between the two rooms survives as a small element of wall. The room has a chimney breast on the southern wall and light is provided by a window to the west.



4.15: Red Lion Inn, first floor, Room 8a, east facing



4.16: Red Lion Inn, first floor, Room 8b and 8c, south facing

The only original room located on the first floor is to the south-east. This room (5022) was enclosed with a single doorway to the main open area in the north-west corner. It was served by a chimney-breast on the southern wall and lighted by a window to the east. The original entrance and exit points are unclear but it is likely that it was originally served by the main stairwell. The stairwell (5023, Room 9; 4.17) was aligned east-west with an inserted fire-glass wall at the western end. A small square landing gives onto room (5020) to the north and (5024) to the west. It is not clear if there was originally an access point to the south and room (5022).

The attic (4.18) of the front range is accessed via a trapdoor and stairwell from room 5021. It was plain with no internal trusses, the rafters being supported on two purlins, which were in turn

supported on the gable walls (north and south) and two short cross-walls half way across the attic.



4.17: Red Lion Inn, Room 9, west facing



4.18: Red Lion Inn, attic, south facing

The rear range

The rear range is internally split into two parts. On the ground floor there is a single room that leads directly from the front range (5016, Room 6; BS126; 4.19). This has a single doorway leading from the east-west corridor (5014). The original plan has a chimney breast on the rear (eastern) wall with light provided by a window to the south. A doorway has been subsequently cut to the north and a ramp leads to an open entrance to the main area of the rear range to the east. The original plan is unclear but suggests that this may have been a single-storey block to the rear of the 1877 cottages that was subsequently subsumed in the rear

range. The main room (5017, Room 7; 4.20) of the rear range is open with a wide doorway and window to the south and single doorway to the north. The room has been reduced in size by the insertion of a north-south breeze block wall to convert the eastern half of the room to two toilet blocks (5018), internally sub-divided east-west. These toilet blocks are accessed from the exterior via two doors in the eastern gable wall (5003).



4.19: Red Lion Inn, ground floor, Room 6, east facing



4.20: Red Lion Inn, ground floor, room 7, south-west facing

The first floor plan follows that of the ground floor. At the western end is a large room (5024, Room 10a; BS127; 4.21) sub-divided into three parts. These are a small toilet located in the north-west corner with a small window providing light; a kitchenette in the north-east with a window to the north, the chimney breast has been removed (Room 10c; 4.22) to the south was a larger room that was both a corridor to the eastern room and a small room in its own right. The block was entered from the landing and stairwell (5023) of the front range. Originally this had a door with glass panel inscribed 'The Red Lion Inn'. The plan appears to

be contemporary with the conversion of the cottages to an inn and the addition of the rear range and suggests that these were small rooms associated with the use of the large room to the east.



4.21: Red Lion Inn, first floor, room 10a, west facing



4.22: Red Lion Inn, first floor, room 10c, north-west facing

The final room is a large open room (5025, Room 11; BS127; 4.23, 4.24) with a series of four windows to the south and two to the north, with a doorway to the exterior flight of steps. The room is

entered from the room to the west (5024) via a doorway. The room has an open plan served at either end by a chimney breast and surviving metal range and hearth to the west and a second chimney breast to the east. The original roof trusses are partially exposed revealing three trusses with a King post design with raking struts. Above was a partially lowered ceiling.



4.23: Red Lion Inn, first floor, room 11, east facing



4.24: Red Lion Inn, first floor, room 11, west facing

Phased Interpretation

The following represents the phased development of the Red Lion Inn based on historical, cartographic and material evidence gathered from the fabric of the building.

Phase 3: Construction of a series of cottages in 1877 along the eastern side of Ollershaw Lane including the front range of the Red Lion Inn. It is likely that the original layout was two cottages side by side. Examination of the exterior of the contemporary property on the opposite side of the street suggests a similar layout with two semi-circular arched doorways to two separate properties. Although it cannot be totally confirmed

it is likely both had a straight stairwell with a two-up, two-down floor plan arrangement. It is not clear if the attic was adopted as accommodation. It is certainly large enough, but unless it has been removed there was no evidence of internal division. The building first appears on the c. 1880 base plan for the sale of the Red Lion Hotel and later on the second edition Ordnance Survey map of 1898 as separate properties with a short wing to the rear. It is likely that the wing to the rear was a single-storey and possibly an outhouse. A block at the rear of the garden suggests that the sanitary facilities were separate from the main building.

Phase 5: Construction of the rear range by 1910. The building is denoted on the 3rd edition Ordnance Survey map of 1910 as 'The Red Lion Inn' and has become a single property with the rear range visible. The interior was probably altered at this time, a stairwell would have been removed and the internal divisions on the ground floor laid-out accordingly. The first floor would probably have remained as a series of small rooms. There is no evidence of cellaring yet discovered and the high water-table precludes the use of cellaring locally. This suggests beers, wines and spirits would have been stored in one of the rear rooms on the ground floor. The extension to the rear was built possibly adopting some of the original fabric of the rear range of the 1877 (Phase 3) cottages. The ground floor room at the western end was a beer store to the main public rooms. There is a very large chimney breast that may have supported a substantial range suitable for cooking but seems incongruous with its function for storing beer. The ground floor layout was associated with stables and this explains the absence of internal lighting in the eastern room. The original doorways are narrow for stables and there appears to be no obvious cart entrance. The 3rd edition Ordnance Survey map of 1910 suggests an entrance may have lain to the north. In contrast there is no physical evidence for this. Poor quality brickwork on the southern elevation may betray the former location of the cart entrance, but cartographic evidence suggests this was an enclosed back yard. This may be because the room was used for canal barge horses and not cart horses. The first floor appears to conform to an original layout. The smaller rooms at the western end appear to be

broadly original in layout. The window alignments on the northern elevation, one smaller adjacent to one larger, suggest that the 'smallest room' was original and suggests that sanitary facilities were included in the building for the first time. The other rooms may have been guest or resident's rooms as an extension to facilities on the first floor of the front range. The large eastern room is of interest as it always appears to have been heated. Its large open nature on the first floor but the presence of chimney breasts that were original and integral to the building suggest this was not a warehouse. It was built as part of the main complex of the inn and may have been a meeting room or for entertainment.

Phase 6-7: The buildings were used as a lodging house during the later 20th century. Some contemporary change of plan may have occurred at this time but it seems to have adopted the plan of the Red Lion Inn. It is probable that the lower ground floor rooms of the rear range were opened to create one open room.

Phase 8: The buildings were taken over by Royal Vale Borough. The buildings were improved at this time and made into offices. Some loss of the internal fabric undoubtedly occurred. Internal walls were removed to create an open plan office on the upper floor and two larger single rooms on the ground floor, which are now used as exhibition rooms. All but one fireplace had already been removed leaving the surviving one in the upper meeting room of the rear extension. Blocked windows were re-opened and replaced with sash windows. Some doorways were opened up or blocked. The building was underpinned and concrete floors with new damp proof courses inserted. Some internal walls were replaced by plasterboard alternatives. The greatest alterations were made in the upper front rooms where office accommodation was provided. The whole building was rewired and re-plumbed. The slates were replaced over felt. Unfortunately, the chimneystacks were removed and not replaced. Almost all the original internal features were also removed. There are no original skirting boards, picture rails or doors left within the building. Toilets have been inserted with entrances from the rear.

4.2 THE BRINE TANK

Historical Background

The area of the Brine Tank was originally located east of a complex of cottages located adjacent to the canal.⁶⁶ This was on the very edge of the Lion Salt Works complex and located adjacent to the lane or road that ran along the eastern boundary (west of the Alliance Works).

The building was erected in 1894-1898 and corresponds with the construction of the brine shaft to the south. It supports an iron-plated brine tank. Beneath the tank are two spaces which housed the original Lancashire (twin-flued) boiler, by Galloways of Manchester; and a horizontal steam engine, which has now gone. Boiler feed water was drawn directly from the nearby canal. The horizontal engine was by Craven Brothers of Manchester, and it had a 14 inch diameter cylinder and a 28 inch stroke. This engine pre-dated that in the existing pump house. Originally, this structure was probably known as the 'Engine House', rather than as the 'Brine Tank'.

The steam from the engine was vented by Chimney 4.⁶⁷ This vented both the boiler beneath the Brine Tank and the northernmost pair of fishery pans. It was first shown on the 1898 Ordnance Survey map⁶⁸ before the fishery pans were built suggesting it originally served the engine house, beneath the Brine Tank and was only later used for the pans. It appears on the 1947 Aerial Photograph⁶⁹ and can be seen as a short shadow, probably the shortest chimney on site. It was demolished in c. 1960 to enable the construction of Stove House 5.

The brine tank itself was listed in the 1899 inventory, and has a capacity of 30,000 gallons. Brine was pumped directly from the shaft into the tank, from where the brine was fed by gravity to the salt pans.

Over the course of the last century the area of the brine tank appears to have been subject to a degree of subsidence. The tow path of the canal

has been continually raised and now covers the lower sections of the arched window openings on the north and west walls. The support structure shows evidence for historic subsidence, with extra brickwork courses having been inserted to maintain the tank on a level bed. The extent and nature of this subsidence is not entirely clear.

During the 2009 enabling works the openings to the brine tank base were bricked-up and sealed.

Description

The Engine House and Brine Tank is a two-storey multi-function building. The lower ground floor consists of a brick-built structure of two-bays facing south (BS104, BS105, BS106, BS107; 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, 4.31). The upper floor has been designed to accommodate a ferrous metal tank (4.32) to hold brine extracted from the adjacent brine shaft for redistribution around the complex of buildings associated with the Lion Salt Works. The building as whole can be ascribed three parts, the Engine Room, the Boiler Room and the Ferrous Metal Brine Tank.



4.25: Engine House and Brine Tank, 2012, north facing

The lower part of the structure is constructed of two distinct phases of brickwork, along with patching and minor repair throughout. The earliest phase of brickwork reveals that the building has slumped north-south. It is of hand-made red brick in English Garden Wall bond with a lime based mortar (6691, 6699, 6716, 6722). Subsequently the building has been rebuilt and the brickwork levelled using a second later phase of machine-pressed red brick in English Garden Wall bond (6692, 6700, 6717, 6723).

⁶⁶ Matrix 2011, gazetteer no. 33

⁶⁷ Matrix 2011, gazetteer no. 23

⁶⁸ Volume I, 5.5

⁶⁹ Matrix 2011, fig. 11

The principal façade to the south has two large doorway bays with eroded sandstone sills (6693, 6694; 4.25) with a continuous wood lintel above (6695). A cross-member can be seen end on above this (6696). The bays have been breeze-blocked in-filled and rendered in 2009 (see 4.26).



4.26: Southern Façade during remediation work in 2009, north-east facing

The western façade shows clear evidence of the slumping of the earlier brickwork (6699) north-south (4.27). A single beam (6721) acts as a tie-beam on top of the brickwork that has subsided. The later upper phase of brickwork (6700) is clearly designed to level the building. Two inserted ties (6715) and a series of three wall plates, one octagonal (6707) and two circular (6706, 6708) have been used to reinforce the wall. There are three segmental brick arches on the western façade. One is a low structural arch (on the southern end, 6703). This overlies a large ferrous metal frame c. 3.20m wide, extending below ground (6704). The other two are semi-circular arched openings that have been rebuilt in 2009 with blue engineering brick and breeze-block in-filled (6701, 6702; 4.28). A series of steam pipes (6710, 6711, 6712, 6713, 6714) extend from the upper part of the wall in various locations at the southern end. They appear to pass in the direction of the engine base (6643, 6644, 6645).

The earlier brickwork (6716) on the northern façade extends half-way up the wall on top of which is a large timber beam (6718). Later brickwork (6717) is constructed on top of this. Two plain low segmental brick arches (6719, 6720; 4.29). Both now lie below the level of the canal.

They have been rebuilt with blue engineering brick and then breeze block in-filled in 2009.



4.27: Engine House and Brine Tank, 2013, east facing



4.28: Engine Room opening, south-east facing, 2009



4.29: Engine House and Brine Tank, 2012, south-east facing, photo courtesy of English Heritage

The eastern façade has lower brickwork as previously described (6722) that like the western façade has subsided from north-south. The earlier brickwork dramatically bulges at the base. Two large beams in the centre (6726) rest on top of this brickwork. Above this is later brickwork (6723) is built above this. The beams also act as the wood

lintel for a single opening (6725; 4.30, 4.31). It has a plain sandstone sill, badly eroded and in-filled by breeze-blocks in 2009. Originally it was larger but has been in-filled on the southern side with later brick (6724). Two wall plates, one octagonal (6727) and one circular (6728) correspond with those on the western side (the third is missing, found located on the floor). Two vertical I-beams (6729) that are almost entirely corroded retain the wall at the southern end. A water or steam pipe (6730) runs vertically up the face at the southern end and enters the eastern room (the boiler house).



4.30: Engine House and Brine Tank, 2012, west facing, photo courtesy of English Heritage



4.31: Engine House and Brine Tank, with SH5 in foreground, west facing, 2009

The interior plan consists of two rooms located side by side, with the principal openings to the south. The following description is based on historic records and photographic evidence as the rooms were sealed in 2009.

Room C1, the western room (4.33, 4.34) is open. It formerly housed the original steam engine. This would have been located centrally. The opening to the north and west indicate low openings for coal or pipework. Three narrow ties run east-west at

head height across the room that correspond to external wall ties (6706, 6707, 6708, 6727, 6728). The steam engine base and a possibly a header tank for the boiler were located west of the Engine House.



4.32: Brine Tank, north-east facing, 2013



4.33: Interior of the Engine Room, north-west facing, in 2009



4.34: Interior of Engine Room, north facing, in 2009

Room C2, the eastern room was the boiler room. The doorway was originally bricked in loosely (see 4.35, 4.36). Three narrow ties run east-west at head height across the room that correspond to external wall ties (6706, 6707, 6708, 6727, 6728). The boiler (6731) itself was housed in a brick base and orientated north-south (see Plate 6.13.12). It was a 'Cornish' type boiler with a single flue. The 1900 inventory describes a 'Lancashire (twin-flued) boiler, by Galloways of Manchester' but this is clearly not present.



4.35: Entrance to Boiler Room, north facing, in 2009



4.36: Lancashire Boiler, north facing, in 2009

In the north-west corner was a large Cameron pump (6732; 4.37, 4.38). This has been suggested to have variously been used to pump creosote to

the works from barges (creosote was burnt with the coal to precipitate a heavy soot which could be scrapped from the flues for sale as 'lamp black') or to pump brine from barges to the works following failure of the brine pumps at the Lion Salt Works. It would seem more likely that it was used to pump water for the boiler from the canal to a header tank located adjacent to the engine house.



4.37: Large Cameron Pump, housed in the Boiler Room, in 2009



4.38: Large Cameron Pump, housed in the Boiler Room, in 2009

The Brine Tank (6697) is supported on a series of east-west wooden joists (6698). Two major beams (c. 15" square) sit centrally, with supporting beams at either end on the northern and southern façades. Between are a further 22 joists. These are in turn supported on wall plates along the brickwork below, and the brine tank is supported on a wall plate above.

The Brine Tank (6697; see 4.32, 4.39, 4.40) is constructed of a series of ferrous metal panels, riveted together with ferrous metal stanchions holding the vertical panels to the base. Six panels are located on the northern and southern faces, with 9 panels on the eastern and western faces. It measures 10.75m (north-south) by 7.50m (east-west). Salt has impregnated the panels and caused flaking and perforation of the metalwork. The tank is covered with a black pitch substance and large white lettering advertises the museum opening hours from the 1970s on the western and eastern faces. A single brine pipe (6733) can be seen extending from the interior.



4.39: Brine Tank, overhead view north facing, in 2013



4.40: Brine Tank, interior south-west facing, in 2013

The ferrous metal brine pipework is attached to the exterior of the brine tank. They are constructed of collared lengths of cast iron

pipework, which follows paths from the Brine Tank to the different pans.

On the south-west corner of the Brine Tank a pipe (1000, 4.41) exits from the front of the tank and has a stop tap at this location. It passes down and into the ground and continues from here via an underground pipe to the south where it connected with pipework feeding Pan House 3 and 4 as part of the salt-making process.



4.41: Brine Pipe, 1000, exiting southern face, in 2012

A further brine pipe (1001, 4.42, 4.43) extends from the south-western façade with a stop-tap also at the top that extends around the building before heading down and underground and passing to the east where it presumably (as no remains recorded) fed Pan House 5.



4.42: Brine Pipe, 1001, exiting western face, in 2012



4.43: Brine Pipe, 1001, exiting west face, east facing, in 2012

A further set of brine pipes (1002, see 4.44, 4.45) were removed in 2012 prior to treatment of the brine shaft. It was not connected to the Brine Tank and had been disconnected from the other pipes. It extended to the west and fed Pan House 2. This is likely to have continued to the west and originally also have fed Pan House 1. Collapsed remains of brine pipes have been located in the ground floor of Stove House 2 (see Section 2.3).

A series of brine pipes fed the brine tank from the new bore and Nodding Donkey hole to the south. A set of brine pipes (1025, see below) were left *in situ* that fed from the Nodding Donkey and brine bore hole to the south. The remains of a series of brine pipes leading from the Nodding Donkey brine pipes around the former remains of Stove House 5 (now dismantled) were removed in 2009. These are stored on site awaiting reconstruction.



4.44: Brine Pipe, 1002, east facing, in 2012

A further set of brine pipes (1003, see 4.46) that ran north-south and up the side of the Brine Tank were also left *in situ*. They involved a single brine pipe running along the floor, with one suspended in the air vertically. A further pipe at the end

passed up the side of the Brine Tank and had a U-bend allowing brine to pass into the tank. These were removed from in 2012 prior to treatment of the brine shaft as they were about to collapse. They are now stored on site.



4.45: Brine Pipe, 1002, south facing, in 2012



4.46: Brine Pipe, 1003, entering Brine Tank, north-east facing, in 2012

Phased Interpretation

Phase 4: The Engine House was built in 1894-1900 contemporary with the adjacent Brine Shaft (see Volume III). It had two rooms. The western room housed a steam engine and pump. It seems unlikely that the Nodding Donkey and Steam Engine (see below) were salvaged from this location and put in the new pump house, but this is not impossible. The steam engine would have allowed pumps to remove brine through 1 of 2 bore holes (1004, 1005). The eastern room housed the Cornish boiler. The waste-gas flue from the boiler passed underground to Chimney 4 located c.

10m to the south located during the watching brief on the Brine Shaft (see Volume III). The earliest phase of brickwork on all four façades relates to this phase. It is however unclear if the Brine Tank is part of this phase. It is included in the inventory of 1900. However, the Murgatroyd's Pump House, Middlewich had a pitched roof and this may be a remnant of an earlier design.⁷⁰

Phase 6: The more likely alternative is that the Brine Tank was original but the structure was redesigned. The reason for the redesign is apparent in the slumped brickwork along the western and eastern elevations. In addition the entire southern façade has largely been rebuilt. Overall this suggests that extraction of brine had caused subsidence around the Brine Shaft possibly resulting in its subsidence by between 0.80-1.0m in depth. The long established theory that subsidence on the site was a general phenomenon from south-north towards the Adelaide Flashes should perhaps be discounted based on this evidence which is entirely in a contrasting direction. The slumping would correspond with the disuse of the Engine House and associated pump and the building of a new pump house to the south (see Pump House, CWAC forthcoming). This can be dated to 1937-1938.⁷¹ The Engine House was rebuilt as the Brine Shaft went out of use. This explains the largely rebuilt front façade which would have collapsed and been dismantled to remove the Steam Engine. This whole episode would probably have occurred at the very end of the 1930s.

Phase 7: The majority of the pipework dates to the 1960s, the exception being pipe 1000 which may be earlier and original to the Brine Tank as it fed Pan House 3 and 4. Pipes 1001, 1002 and 1003 were inserted in the 1960s contemporary with the building of Stove House 5 and redesign of Stove House 2 respectively. It is difficult to date the location and chronology of any of the pipes given they could have been changed or dismantled easily.

⁷⁰ See OAN 2011b

⁷¹ See Volume I

4.3 THE SOUTH-EASTERN BUTTER PAN AND CHIMNEY 3

Historical Background

The south-eastern butter pan was one of three pans built 1894-1900 as part of an expansion of the works immediately after the purchase of the Red Lion Hotel land plot by the Thompson family. The original remains in the area appeared to be a rhomboid-shaped building.⁷² This building dated to Phase 5 of the works and was probably built 1898-1900.

The map evidence shows the rhomboid-shaped building on the first shown on the 1898 2nd edition Ordnance Survey map.⁷³ It can be seen again on the 3rd edition of 1910⁷⁴ and the 4th edition of 1938.⁷⁵ The stock control plan of c. 1900⁷⁶ shows the two butter pans in this location and the rhomboid-shaped building probably covered the pans.

By 1947 an aerial photograph shows the open remains of one butter pan and two surviving fishery pans to the north (south-west, north-west, north-east). The south-eastern butter pan appears to have been utilised for the pump house and nodding donkey by this time. The complex is visible on photographs from the late 1950s (see 2.187 above).

Adjoining the south-west corner of the south-eastern butter pan was the remains of Chimney 3.⁷⁷ It was the second of a pair of chimneys to work with the row of three butter pans.

It was later converted to operate with the horizontal steam engine in the Pump House. It vented steam from the Boiler House via an underground flue. It was utilised at a later date to vent the flues of Stove House 5, via means of an over-ground flue (see below). Chimney 3 was repointed and the bands were repaired and capped in 1990 (4.47).

⁷² Matrix 2011, gazetteer no. 26

⁷³ Volume I, 5.5

⁷⁴ Volume II, 3.51

⁷⁵ Matrix 2011, fig. 9, 10

⁷⁶ Volume II, 3.52

⁷⁷ Matrix 2011, gazetteer no. 22

The over-ground flue was built in 1965 and was designed to vent the fumes from Stove House 5 (see Section 3.2 above). It ran from the south-eastern corner of Stove House 5 to Chimney 3 on an elevated series of brick piers. It had begun to collapse prior to 2009. It was dismantled along much of its northern length during the 2009 enabling works as part of the dismantling of Stove House 5.



4.47: Pump House Chimney repairs, west facing, during 1990s

Description

The remains of the South-East Butter Pan (see BS108) survive as a low hand-made red brick wall orientated north-south with a series of four brick piers on the eastern side (1017; 4.48, 4.49). The wall is c. 15m long but continues into the interior of the Pump House where it terminated after c. 3m. It turned to the west and survived for a short length as a low hand-made red brick wall (1051) for c. 3m before terminating under the Overground Flue (see below). The wall retained a mass of clinker-ash silt material (1018) to the west of the wall that appears to relate to the former fill of the open pan. The wall was substantial and three skins wide along its eastern side.



4.48: South-east Butter Pan, east wall, south-west facing, in 2012



4.49: South-East Butter Pan, south-east facing, in 2012



4.50: Chimney 3 and Pump House, south facing, in 2013

Chimney 3 was built of machine pressed red brick in English Garden Wall bond (6861; see BS109,

BS113, BS114; 4.51, 4.52). It was 2.10m x 2.10m at its base. It extends to a current height of 16.20m above ground level. A series of three horizontal applied ferrous metal bands pass around the circumference of the chimney at the base with attached angles on each corner (6862). A further 10 individual ferrous metal bands (6863) were located above this, although one was now missing and a further one had collapsed.



4.51: Chimney 3 and Pump House, west facing in 2013



4.52: Overground Flue, north-west facing, in 1990s

The remains of an earlier flue entering the Chimney on its western face were visible blocked with yellow bricks with a lintel of above of a thin ferrous metal sheet (6864).

An underground flue entered Chimney 3 on its eastern side (6768). This curved from the south-east within the Pump House into the chimney on its eastern side. It has two machine pressed red brick wall on either side with metal flue plates above. It continued to the south-east and entered the Boiler House (see below) on its western face. The remains beneath the Occupation Road (east-west access road between the Pump House and Boiler House) were uncovered during external works (see Volume III, Area H1 for details of these excavations).

The over-ground flue ran from the south-west corner of Stove House 5 to Chimney 3. It consisted of two machine-pressed yellow brick walls (1032, 1033; see BS108, 4.52 to 4.57) one skin wide. On top were a series of concrete slabs (1037). At the southern end as it entered Chimney 3 it was supported by two rails 1052, with a ferrous metal plate above. Likewise at the northern end two further rails (1040, 1041) with ferrous metal plates above (now removed) supported the over-ground flue as it entered Stove House 5.

As the flue exited Stove House 5 a damper plate with handle allowed the control of hot air from the flue (4.53, 4.54). As the draw of the Chimney 3 was insufficient to extract the hot air from the works until it got hot, a large fan adjacent to Stove House 5 supplemented the draw of hot air. The walls and slabs had mostly collapsed along its length.



4.53: Overground Flue, as it enters Stove House 5, north facing, in 2009



4.54: Overground Flue, as it enters Stove House 5, north facing, in 2009



4.55: Overground Flue, south facing, in 2009



4.56: Overground Flue, as it enters Chimney 3, south-east facing, in 2012

archaeological watching brief on groundworks in Area G4 that related to the western side of the butter pan kiln. This suggests a large kiln probably double the size of those on site.

Excavated evidence from Pan House 4, eastern and western sill wall revealed remains of wall foundations that ran SSW-NNE in the orientation of wall 1017 that suggest these related to the central and south-western butter pans in the same orientation (see Volume III). Detailed examination of the map and plan evidence suggests that these were a series of three butter pans covered by a large rhomboid-shaped building.

Chimney 3 was originally constructed contemporary with the bank of three butter pans. Excavated evidence from the archaeological watching brief in Area G4 (see Volume III) suggests that an east-west flue served the butter pans to the west. The entrance from the Overground Flue (1032, 1033) served the south-eastern butter pan.

Phase 7: The remains were directly replaced by the Nodding Donkey Complex and Pump House in Phase 7. The material (1018) held back by wall 1017 represents dumps of material from the south-eastern butter pan.

The over-ground flue was constructed in 1965 contemporary with the construction of Stove and Pan House 5. It was designed to vent air from the flues located in the drying level of Stove House 5. It is probable that Chimney 3 adopted a pre-existing flue into the northern face, originally associated with the south-eastern fishery pan (see above).

Phased Interpretation

Phase 5: The low brick wall relates to the remains of the stove wall of the south-east butter pan. An identical wall was discovered during an

4.4 THE PUMP HOUSE

Historical Background

The pump house and nodding donkey were built in the location of the south-east butter pan. The original structure was erected in 1937 and replaced the earlier engine house located under the Brine Tank. It was extensively rebuilt in about 1980 (see 4.57).



4.57: Pump House, north-west facing, in the 1980s

The pump house was probably erected in c. 1938, when the original brine shaft became disused and a new bore hole was sunk and replaced the earlier engine house under the Brine Tank (see above). It was built as a timber planked shed. It is just visible on the c. 1947 aerial photograph of the site⁷⁸ but does not appear on Ordnance Survey maps until 1970.⁷⁹ The pump house was largely rebuilt in about 1980 and much of the cladding dates to this period. The pump house remains almost entirely unaltered from this period and is currently still standing.

It contains a horizontal steam engine, which powers the adjacent 'nodding donkey' beam pump and a winch from a Weaver flat, used to haul wagons on the nearby railway line. The engine was serviced by Marcus Allen of Manchester, and sits upon the top of a former fishery salt pan furnace wall. It may have been originally fed by the boiler beneath the Brine Tank but was subsequently fed by a boiler in the Boiler House to the south which was erected before 1947⁸⁰ (see Section 5.3). Construction design plans exist for the erection of

⁷⁸ Matrix 2011, fig. 11

⁷⁹ Matrix 2011, fig. 13

⁸⁰ Matrix 2011, gazetteer no. 2

the engine, brine pump, and winch dated to 1937. These suggest that the engine was not new but part of a reconditioned apparatus. In addition a series of diaries kept by Alan Kinsey Thompson have recently been donated by the Thompson family detailing the erection of the brine pump.⁸¹

Description

The Pump House is lean-to timber framed and planked shed (see BS109, BS110, BS113, BS114, BS115; 4.58, 4.59). It was constructed of a series of 6 inch vertical timber panels on all four sides (6734, 6746, 6749, 6756). These were built on a frame of six earth-fast posts (6745), with four intermediate posts between. The panels were constructed above a low brick sill wall, 4 courses high (6744).



4.58: Pump House, south-west facing, in the 1990s



4.59: Pump House, north-west facing in late 1990s

⁸¹ LSW (not accessioned) West Cheshire Museums, Now kept in the Weaver Hall Museum collection.

The principal façade faces east and has a single doorway raised above the ground and originally entered by a series of steps (now removed). It had a plain plank and baton door, with two straps and gudgeons (6757). Three openings provide light. These are now clad in chipboard, but originally were clad in corrugated plastic (6758, 6759, 6760). Two signs from use as a museum in the early 1980s are attached to the wall stating 'PUMP HOUSE' and 'MIND YOUR HEAD' (4.61).



4.60: Pump House, west facing in 2013



4.61: Pump House, detail of signage, eastern face

The southern façade (4.62) has a single plank and baton doorway with two straps and gudgeons (6735). It is approached by a concrete step (6743) and further wooden steps internally (6771). A double doorway, with simple strap and gudgeon hinges (6736), to the east of this provided external access to the windlass (see below). Five openings in the southern façade provide light to the interior; again these are clad in chipboard but would originally have been clad in corrugated plastic (6737, 6738, 6739, 6740, 6741).

The northern façade (4.63) had a single recessed opening (6754) at the western side to accommodate the drive shaft for the Brine Pump

as it leaves the building and attaches to the Nodding Donkey. There were an additional four openings clad in corrugated plastic (6750, 6751, 6752, 6753). Extending from the northern side of the Pump House was a diagonal strut (6755) that formerly supported the remains of the Derrick (see below). The western façade (4.64) partially incorporated Chimney 3 within its construction. The remainder had two openings covered with corrugated plastic sheets (6747, 6748).



4.62: Pump House, north facing, in 2013



4.63: Pump House, south facing, in 2013



4.64: Pump House, with Overground Flue and Nodding Donkey, east facing, in 2012

The lean-to roof was supported by three east-west principal rafters (6772), with six purlins (6773)

above. The roof was covered in corrugated tin, with five interspersed translucent corrugated plastic sheets acting as skylight (6761). Lead flashing was visible around Chimney 3. The internal plan (see 4.65, 4.66) was open with a lower ground level to the east and south and a raised bed for the steam engine to the north formed by the remains of the south-eastern fishery pan (1017, 1051, discussed above). The floor was of plain earth (6763). In the south-west corner was a curved wall of machine pressed red brick (6767) that followed the line of earlier underground flue (6768, discussed above). Above the lower level at a mezzanine level, was a wooden walkway between the southern and eastern doorways, with four steps up from the southern doorway. It sloped west to east, and included a four plank rail around the outside (6771).



4.65: Pump House, Interior, south-east facing

The structure housed a series of machines internally including a windlass (6774, installed at an unknown date), a steam engine (6775, installed in c. 1937), an electric motor (6776, installed in c. 1950s to 1960s), a compressor unit (6778, 6779, installed in the 1990s). The windlass (6774) was supported on a very low plank platform (6764) in the south-east corner. The electric motor and compressor were supported on concrete bases (6765, 6766). The large concrete plinth (6769), for

the Steam Engine (6775) was supported at the southern end by wall (6767). A brick plinth (6770) supported the associated flywheel. The machines are discussed in greater detail below with reference to the Brine Extraction Apparatus (see Section 5.3 below).



4.66: Pump House, interior, north-west facing

Phased Interpretation

Phase 5: The earliest remains surviving in the Pump House are those of the South-Eastern Fishery Pan which were absorbed into the Pump House after 1937. The fishery pan was originally constructed from 1900-1910.

Phase 6: The pump house was built in the late 1930s after 1937 in order to house the steam engine associated with the extraction equipment for the new bore-hole. It is unlikely that much of the fabric of the building itself dates to this period. The concrete plinth (6769) for the steam engine (6775), the curved flue (6768), associated curved wall (6767, supporting plinth 6769) and the brick plinth for the flywheel (6770) date to this period.

Phase 7: The entire Pump House structure was probably rebuilt in the late-1970s or early 1980s. This included the addition of new posts and roof structure. Photographs from the 1960s and 1980s show the variation in the form of the Pump House, although the footprint remained the same.

Phase 8: The walkway was added in the 1980s to allow visitors to view the machinery during work, when the Lion Salt Works was opened as a museum by the Thompson's in the early 1980s. Many of the concrete bases were probably added at this time. The compressor (6778, 6779) was added in 1994 to power the steam engine.

4.5 THE BOILER HOUSE AND COAL STORE

Historical Background

The boiler house was built between 1938 and 1947 in association with the new brine bore-hole. The boiler house was abandoned when the Steam Engine was converted to be powered by an electric motor. It was last used in about 1980. Asbestos was removed in 1991 and the brickwork was re-built and re-pointed. The coal store is of unknown date but has been added between the 1930s and 1960s when it is visible on historic photos.

Description

The building consists of two parts; firstly a building of brick and timber construction which houses the boiler itself; and secondly the coal storage area, of timber construction (see BS116, BS117, BS118, BS119, BS120).



4.67: Boiler House, east facing, in 2013

The boiler house was built of hand-made red brick in English Garden Wall bond to a height of 1.8m (6789, 6794, 6800). On the western gable end (4.67) the remains of a segmental arched flue (6796) that continued to the north-west where it entered Chimney 3 as flue (6768). Also visible on this face were the words 'SHOP' in faint whitewashed letters. The wall has bulged on the southern side (4.68, 4.69) and is retained by an

octagonal wall plate (6801) and seven wall braces (6802). Above the brick base it was constructed of a wooden frame with horizontal panels (6790, 6795, 6803). In the northern face (4.70) was a central opening now nailed shut (6791). Against the western gable end was a wooden panel (6797) that covered the remains of a damper plate. The damper plate was raised via a pulley (6798) attached to a wooden brace housed in the apex of the gable. The roof was pitched and covered in felt with wood braces (6792). Metal gutters and down pipes were located on northern and southern sides (6793, 6804).



4.68: Boiler House, east facing, in 2013



4.69: Boiler House, wall plate, south face, in 2013

The coal storage area is of simple lean-to construction (4.71, 4.72). It is of simple wooden frame and vertical panelling (6805, 6807). A badly

damaged plank and baton door, with plain straps and gudgeons (6806) opens to the north. On the eastern side a single wooden casement window is now boarded with chipboard (6808). The whole structure has been fire damaged by vandals in 2003.



4.70: Boiler House and Coal Shed, south facing, in 2013



4.71: Coal Shed, south facing, in 2013

Internally the structure included the Cornish (single-flued) boiler, by William Lord of Bury (6812, see Section 5.3, Brine Extraction Apparatus below, 4.73, 4.74). It dominated the entirety of the boiler house. Three inch diameter steam pipe (6799) extended from the apex of the western gable and

probably fed the steam engine in the Pump House. A further three inch diameter steam pipe (6813) passed to the south from eastern end of the boiler, originally passing along the exterior of the Manager's House towards the Smithy and the Abraham Lord Engine housed there. In the Coal Store a single ferrous metal pipe (the blow-down) extended from the base of the boiler (6814) in a brick lined flue (6818) at its eastern end. The flue had been covered by a series of two ferrous metal plates (6815, 6816, 4.75). At the eastern side of the Coal Store was a low wooden bench (6817, 4.76).



4.72: Coal Shed, south-west facing, in 2013



4.73: Boiler, west facing

Phased Interpretation

Phase 6: The Boiler House was originally built contemporary with the first Pump House as part of the complex of buildings associated with the brine extraction apparatus and bore hole drilled in c. 1937. The origin of the Cornish Boiler is not clear but is almost certainly second hand and reconditioned in this location.

Phase 7: The Coal Store was a slightly later addition designed to cover and protect the front of the boiler.



4.74: Boiler House, Interior Roof



4.75: Coal Shed, floor



4.76: Coal Shed, bench

4.6 THE MANAGER'S HOUSE

Historical Background

The manager's house was built in c. 1899 and is included in an inventory of the works by Edward Ward. The building appears to have remained remarkably unchanged except for the addition of a rear lean-to store and the addition of the boiler house on the north-west corner.

In 2003, restoration work was undertaken and slates were replaced above the roofing felt. Soot was removed from the roof space. An electric damp proof system was inserted and sections of timber frame were replaced where rotted. The window on the south wall was replaced. In 2003 the windows were broken by vandalism.

The style of building is very common in Northwich. The buildings were designed with an integral timber-frame to allow them to be resistant to subsidence. In the event of subsidence they could be lifted to a new height to allow the intermediate street level to be raised. An episode of the town's history in the 1920s known colloquially as the 'Big Lift' saw large areas of the town lifted from where they had subsided. This was particularly prevalent by the river where flooding was common. Older Georgian buildings were demolished, and 19th-century buildings that had subsided were in-filled at ground floor level and reduced in height to single storey buildings. However, the timber-framed buildings were lifted on stilts by as much as 2m or more.

The town centre proliferates with examples of the 19th-century timber-framed revival. The origin of the tradition is unclear but may suggest continuity from earlier medieval timber-framed tradition that never died out. The earliest clear example is possibly the Market Hall dating to 1843. However, it was not until the last decade of the 19th century that the narrow external frame with brick-nogging became common for new structures. Three Northwich based architects, M K Ellerton, J Cawley and A W Bostock, adopted the style throughout the town from 1890 for the following decade and a half. Examples are much more complex than the simple design of the manager's office and line the High Street and Market Street. Better comparative

examples are perhaps given by simpler outbuildings notably located along the rear of High Street and Market Street to the north and south. The introduction of steel meant these buildings became less common during the inter-war years and were eventually replaced entirely by steel frame buildings after the war.⁸²

Description

It is a small single-storey building constructed in a distinctive local style designed to be subsidence resistant (see BS116, BS117, BS118, BS119). It adopts a simple timber-frame, with vertical posts and studs, sill-beam at base and wall plate above. The interior of each panel is brick-nogged (i.e. in-filled in red brick in a simple stretcher bond). This style of construction allows buildings to survive settling and minor subsidence by allowing the timber-frame to spread the weight of the building more evenly.



4.77: Manager's House, south-west facing, in 2013



4.78: Manager's House, west facing, in 2013

The principal, eastern façade (4.77, 4.78) has a simple timber frame of two corner posts and 11 studs, with sill beam below and wall plate above

⁸² Wood 1981

(6820). This rests on a low sill wall of machine-pressed red brick in Stretcher bond, with cement mortar (6821) and the panels are brick-nogged with identical brickwork (6819). The central doorway is raised above the ground level (originally entered via a series of three wooden steps, now removed), with moulded architrave surround. It has a moulded four-panel door, painted white and detailed with a slot letter-box and latch handle (6822). This is flanked on either side by two wooden casement windows (6823, 6824, 4.79), of three panes, with a row of nine smaller panes above. The roof above is pitched and covered in plain, grey, Welsh slate (6827). It is supported by a series of 25 rafters (6827). At either end is a simple chimney stack with two surviving pots (6825, 6826, see gable descriptions).



4.79: Manager's House, western window detail



4.80: Manager's House, southern window detail

The southern gable (4.80, 4.81) again has a plain timber frame (6829) of two corner posts, with a single stud either side of the chimney stack and gable truss above. This is brick-nogged with machine-pressed red brick in Stretcher bond (6828). The timber-frame sits on a low brick sill as before (6830). The chimney stack (6825) dominates the centre of the gable, with a plinth half-way up, corbelling at the top and a single rectangular pot (other pot removed/ absent). A single wooden casement window (6831) was located east of the chimney stack. It had a single lower pane, with four small panes above, and had been boarded over with chipboard.



4.81: Manager's House, north facing, in 2011

The western façade (4.82, 4.83) was similar in its original form to the eastern façade. It had a simple timber-frame (6833), on top of a low sill wall (6834), with brick-nogging in each panel (6834). A simple wooden casement window (6836), as previous, at the northern end is the only feature.

It has been altered to include a later low lean-to brick store room extending to the rear. This has been built on a low brick base of machine cut red brick (6839), over which is a skimmed concrete slab (6838). The walls of machine-cut red brick in English Garden Wall bond are built directly off this base (6837). The lean-to corrugated tin roof slopes east-west. It is supported by a single rafter cum

cross-beam, and lined underneath with tongue and groove panelling.



4.82: Manager's House, east facing, in 2013



4.83: Manager's House, Eastern Window Detail

The northern gable end (4.84) is largely obscured by the low lean-to extension of the coal store adjacent to the boiler house (see above). It is very similar to the southern gable with a plain timber frame (6842), on top of a sill wall (6843) with brick-nogging in the panels (6841). The central chimney stack (6826) is identical to the southern one, with two pots, one circular and one square. The upper 10 courses of the chimney breast stack has begun to lean to the south. Again a small, wooden, casement window (6844), as previous, is located in the panel east of the chimney stack.



4.84: Manager's House, south facing, in 2011

The interior plan was originally a simple three room plan: the lobby, Manager's Office and Clerk's Office. The floor was raised above the ground level on a series of east-west joists, on which were laid 6" floor boards, orientated north-south (6845). The rooms were separated by a series of wooden stud walls (6857). The interior was clad in original plain tongue and groove panelling, with 4½" wide panels throughout including the ceiling. There was a simple chamfered skirting board at floor level and a simple curved cornice to the roof.

The building was entered from the east via a small entrance lobby (4.85, 4.86) with doors to west and north allowing access to the other two rooms. The door to the Manager's Office was a plain, wood, four-panelled door (6852). That to the Clerk's Office was a plain panel door with nine glass panes at the top (6853). The lower three panes had been painted white to provide increased privacy. A ledge and porter's window (4.87, 4.88) were located in the northern wall. It had nine panes in a square, of which the lower formed a hatch (6855).



4.85: Manager's House, Internal Lobby, in 2013



4.87: Manager's House, pay window detail

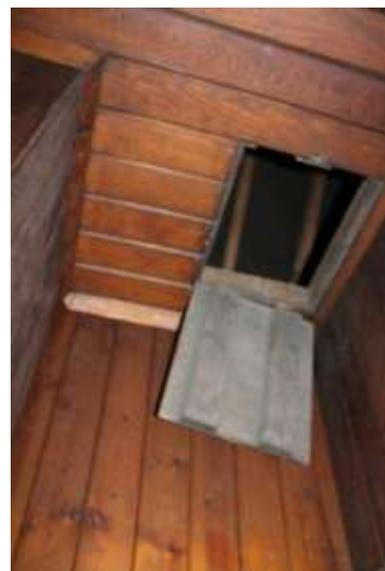


4.86: Manager's House, Internal Lobby, Door to Clerk's Office



4.88: Manager's House, pay window detail

Again the windows had been painted white for privacy. This was where workers came to receive their pay allowed light into the Clerk's Office and provided a barrier separating the management from the workforce of the site. There is a single small hatch in the ceiling that gives access to the roof space (6856, 4.89).



4.89: Manager's House, Trapdoor in lobby to roof space

The Director's Office was located south of the lobby (Plate 4.90, 4.91). It had plain floorboards,

covered with a patterned linoleum floor cover (6850), 2.77m x 3.77m in size. A simple cast-iron hearth (6851) was located against the southern gable. It had a wedge shaped flue, with cast-iron semi-circular arch, with beaded and floral patterns. The surround was of plain slate and had collapsed.



4.90: Manager's House, Director's Office, north facing



4.91: Manager's House, Director's Office, south facing

The Clerk's Office was located to the north of the lobby (4.92, 4.93, 4.94, 4.95, 4.96). There is a connecting corridor between the Manager's and Clerk's office with plain panel door (6854) on the west side of the building, separated from the lobby. A plain plank and baton door (6858) exits the building to the west and rear of this corridor. This now forms the entrance to the rear store. In this corridor is a panelled, fitted cupboard with plain doors, partially removed (6848). The main area of the room is dominated by a cast-iron range (6849) against the north wall. This was built by 'S MORELAND OF NORTWICH'. It has a central flue to the chimney stack with a grate beneath. On the right hand-side is a shelved oven with three shelves (door now lost). Embossed patterning is

visible on the sides and a series of vents allow air to be controlled to the oven/ hearth. The fireplace has a rendered cement surround. In the corner of the room is a small fixed shelf (5372) and to the east is a simple lean-to desk (5330).



4.92: Manager's House, Director's Office, hearth



4.93: Manager's House, Clerk's Office, Desk and Stools



4.94: Manager's House, Clerk's Office, Hearth

The rear store (described above, 4.97, 4.98) is a simple enclosed space to the rear of the building. Two sets of shelves are located against northern and southern walls (5373, 5374). These have been used after the closure of the works as the on-site store for artefacts, which were not originally

catalogued and taken to the central store (see Moveable Objects contexts 5334-5371).



4.95: Manager's House, Clerk's Office, Cupboard



4.96: Manager's House, Clerk's Office, north facing

Phased Interpretation

Phase 4: The southern room originally acted as the Manager's Room and was the main office of the works that was occupied by the various generations of the Thompson family who ran the works starting with Henry Ingram Thompson, before being used by John Ingram Thompson, Alan Kinsey Thompson and eventually Henry Lloyd Thompson. The northern room was the clerk's office. This was where the paperwork and ordering

was undertaken and where the wages were calculated. Work was done predominantly on piece work. The members of staff would calculate the amount of salt they produced and this would be checked by the Thompson's. Evidence for this practice has been found in the form of a number of old cigarette packets that have the piece rates for the week written down for Harold and P.D. These were found tucked into the door frame of one of the Pan Houses. A glass window with ledge acted as the clerk's counter. The glass was predominantly white-washed out to provide the clerk with privacy from the workers. The staff would get their wages in jam jars that were passed through a hatch in the window rather than face to face.

Phase 8: The room was cleared in 1986 by members of Cheshire Museum services and the objects found within the office were catalogued and archived.⁸³



4.97: Manager's House, Store, west facing



4.98: Manager's House, Store, north-west facing

⁸³ These are now stored with West Chester Museum services and discussed in detail in Volume V, Section 7.

4.7 THE SMITHY

Historical Background

The Lion Salt Works smithy was erected in c. 1900. It first appears on the 1910 3rd edition Ordnance Survey map. It is shown in its current form with three separate rooms, presumed to be the forge to the north, the store in the centre (Store 1) and the joinery store to the south (Store 2). Another small independent building is shown to the north. This arrangement of buildings is still visible on the aerial photography of the site in c. 1947. On the 1954 Ordnance Survey map, the small building to the north has disappeared and has presumably been demolished. It is replaced by the 1960s by a cart shed first visible on the 1970 Ordnance Survey map.⁸⁴

In the 1980s the area between the smithy and the cart shed was covered over in order to make a shed for the Abraham Lord steam engine (see below, Section 6.3). This had been moved from a location to the east of Stove House 2 in the 1970s before finally being rehoused in this location. It was placed here to drive the line shafting associated with the circular bench saw and guillotine punch, as part of the early 1980s working museum run by the Thompson family.



4.99: Smithy and cart shed, west facing, late 1980s

In the early 1990s the buildings north of the smithy were demolished to make way for new access road to the site (replacing the existing road between Pan House 3 and 4 and the Red Lion Inn). The remainder of the smithy was repaired in 1996 (4.99, 4.100). At this time corrugated iron sheeting covering the Smithy was replaced by new sawn boarding. The north-west corner post had rotted

through and was replaced with a new oak post. The roof was recovered in a combination of original and new Welsh Grey slate. A replacement canopy was built over the circular saw.



4.100: Repairing the Smithy roof, in 1996

Many of the forge and smithy tools were still *in situ*. However, it became clear that a large number had been removed for storage at the Grosvenor Museum and Weaver Hall Museum and Workhouse in 1986. The 1980s line-shaft that extends through the east elevation which formerly drove a circular saw and guillotine still survived *in situ*. The remainder of the buildings had been extensively used as a general store for the site from the mid-2000s.

Description

The Smithy was a single storey timber-framed building of four bays split into three separate rooms entered from the eastern side: the Forge, Store 1 and Store 2. It was orientated north-south and located at the southern end of the site, to the rear of the gardens of a series of terraced cottages along Ollershaw Lane (see BS121, BS122, BS123, BS124, BS125).

The principal façade was to the east (4.101, 4.102). It was clad in horizontal wooden planks at the southern end (6868) and vertical wooden planks at the northern end (6869). A sill wall of machine-pressed red brick (6870) supported the internal stud wall (described below). Three doorways passed to the interior rooms. A double doorway with decayed plank and baton door (6872) passed to Store 2. It was flanked to the south by a four-pane wooden sash window, covered with chicken mesh (6871). To the north a single collapsed plank and baton door (6873) led to Store 1. Located

⁸⁴ See Volume II for mapping evidence

adjacent to the door and to the south was an opening for a further sash window (6924) that had been over-clad with planks. The smithy was entered by a single doorway, replaced by a very poor quality modern plank and baton door (6874). A series of three lights gave on to the smithy: a former sash window, the frame remaining (6875), a wood casement window of 15 panes (6876), and a ferrous metal casement window, of which only the wooden surround now survives (6877). A cast-iron gutter ran the length of the eave (6879), with a downpipe at the northern end (6878).



4.101: The Smithy, west facing, in 2013



4.102: The Smithy, south-west facing, in 2013

The northern gable (4.103) was again clad in vertical timber planks (6865) attached to the internal timber frame (6892). A central double doorway with plank and baton doors (6866) was the main entrance to the Smithy Forge. A single cast-iron down pipe drained the western gutter. The southern gable (4.104) was plain with no openings. The timber frame (see below) was supported on a machine-pressed red brick sill wall in English Garden Wall bond (6884). The mortar had decayed and the wall had begun to collapse. The panels at the southern end were initially horizontal (6882) and the gable was covered with

vertical planks (6883). Two cast-iron down pipes (6885, 6886) led from the gutters on the side.



4.103: The Smithy, south-east facing, in 2013



4.104: The Smithy, north-west facing, in 2013

The western elevation backed onto the rear garden of two properties on Ollershaw Lane and access was restricted. Examination of the interior allowed understating of its construction however. The structure was supported on a low sill wall (6889) at the southern end that gave way to a c. 1m high area of brick nogging (6905) throughout the northern end within the Smithy Forge. This was over-clad with vertical boards (6888) at the northern end and horizontal boards (6887) at the southern end. A cast-iron gutter (6891) ran the length of the eaves on the western side. The roof was pitched and covered in grey Welsh slate (6880), with grey ceramic ridge tiles. On the ridgeline at the northern end was a small louver (6881; lacking the louvers themselves) that acted as a vent for the Smithy Forge.

The original timber-frame was constructed in two parts. The northern three bays representing the Forge and Store 1 appeared to have been constructed first, with Store 2, a joinery store, added later. The timber frame was constructed on a series of low, machine-pressed red brick, sill walls (6870, 6884, 6889, 6890). The northern element had two trusses (see 4.105) supported on stud walls at the northern (6892) and southern (6893) ends. They were of King Post design resting on a horizontal tie-beam that was supported by corner posts at either end. The two evenly spaced central trusses (6894, 6895) were similar of King Post design with raking struts, also supported on posts at either end. The purlins (6922) are staggered and lap jointed to the principal rafters. The ridge beam (6923) slots into the apex of the King Post. The eastern (6897), western (6898) and northern (6892) walls consisted of full length studs unevenly distributed with two or three to each bay and aligned depending on the external openings. They were supported on a sill beam below with a wall plate above. On the western elevation, internally, there were remnants of brick nogging (6905).



4.105: The Smithy, internal, the Forge roof trusses, south facing

Two internal stud walls defined the rooms. Between the Forge and Store 1 was a stud partition wall (6900), which rested on a low, machine-pressed, red-brick, sill wall (6899). The wall had eight full length studs on a sill beam with wall plate above. It was clad in a series of horizontal nine inch boards. The southern bay was defined by truss and posts (6896) and built on a machine-pressed red brick, sill wall, two courses high (6904). Above this the original gable end was filled by three studs resting on a sill-beam with the

tie-beam above. It was clad by a series of short vertical planks in three rows (6901).

Store 2 appeared to have been added at a slightly later date. The southern gable (6896) consisted of a King Post truss, with intermediate posts either side. This was supported on two corner posts, with eight full length studs between, resting on the sill beam below. The staggered purlins (6922) continued from the north, and were again lap jointed to the principal rafters. The ridge beam (6923) was trenched into the apex of the King Post. The western (6902) and eastern (6903) walls were again of unevenly spaced full-length studs on a sill beam below. The structure was supported on all three elevations by a low sill wall (6870, 6884, 6890).



4.106: The Smithy, internal, the Forge, north facing

The northern room, the Smithy Forge was the largest of the three rooms (4.106, 4.107). It was entered from the north and east. The floor was earthen with a covering of wooden floorboards (6906), aligned north-south at the northern end and east-west at the southern end. The eastern side of the room had a long wooden work bench, with two drawers and two ferrous metal vices attached (6908). A single post with an attached rail at the northern end defined a stall (6909). This may have been used to tether horses and donkeys during shoeing.

Between the northern gable (6892) and truss 6894 was two horizontal beams (6910) that supported the east-west line shafting (6911). The line shafting extended outside the smithy building and continued to power the guillotine and a bench saw described separately below. It is not clear how these were originally driven but Henry Thompson

reassembled the Abraham Lord of Rochdale Steam Engine (see below) in the cart shed to drive the mechanism in the early 1980s. Two drive wheels on the western end provided power from the steam engine which was positioned just north of the smithy in a shed until the early 1990s. Two further drive wheels at the eastern end provided power for the machines. The smaller wider wheel provided low revolutions with higher torque to power the guillotine. The larger wheel provided lower torque but greater revolutions and powered the circular saw. The most significant item stored but not *in situ* in the room was the dismantled remains of the Abraham Lord Steam Engine in three parts (5418, 5450, 5481, described below in greater detail).



4.107: The Smithy, internal, the Forge, north-west facing

The forge (6866, 4.108) was positioned in the centre of the room. It had a brick base 0.75m high and 2.10m x 1.40m in size, of machine pressed brick in Stretcher bond, with bull-nose bricks at the corners. At the rear (western side) the brickwork was continued up to support the chimney and fire hood of the forge. The chimney was a square stub

structure and was supported on two ferrous metal rails that extended to the western wall of the smithy. Here they were tied down by two loops. The hood over the fire pit was of welded ferrous metal. A single metal vent in the rear of the fire provided a direct blast of air. This was provided via a pipe from a fan (6913) powered by a simple electric motor and drive belt. The air was controlled by a simple ferrous metal damper plate, mounted on a hinge that controlled air flow to the fan, and thus to the fire pit. This allowed close control of the temperature of the fire for working of metal.



4.108: The Smithy, internal, the Forge, south facing

The smithy forge was the most complete of the buildings in terms of identifiable objects associated with the original work. It is likely these had been left *in situ* as part of the display and the remainder were moved to the West Cheshire Museum stores in 1986. All the items are discussed in detail in Volume V, Section 10.

The central room was a small store (termed Store 1, 4.109, 4.110). It was narrow with a floor of machine pressed red brick laid on-side the (6914) Stretcher bond. There was a low bench (6916) on the northern side of the room. On the southern and western side was an overhead store (6915) held up by a central post and cross-beam. It housed a large quantity of hessian sacks. Located in the roof space and over the Smithy Forge to the north was another overhead store (6912). It was accessed via a series of rails applied to the northern stud wall that acted as a ladder.

The southern room was a joiner's store (termed Store 2, 4.111, 4.112, 4.113, 4.114). It was open and larger than Store 1. The floor was again earthen with wooden floor boards overlaid, north-

south (6917). Modern fibreboard had been applied to the walls on the western and southern walls (6918) but was heavily decayed. A lowered ceiling of eight, inserted, north-south joists and fibreboard (6919) had begun to collapse. Against the southern wall were two plain shelves (6920, 6921). The room had been used as a store since the closure of the works and considerable quantity of later material was removed during clearance (see assessment of moveable objects). Beneath these remains was a small ferrous metal stove (5560). A water heater using a reused fibreglass salt tub (5561) was positioned above. A ferrous metal pipe (5561) acted as a flue, and an asbestos sheet at the rear provided a fire guard.



4.109: The Smithy, internal, Store 1, west facing



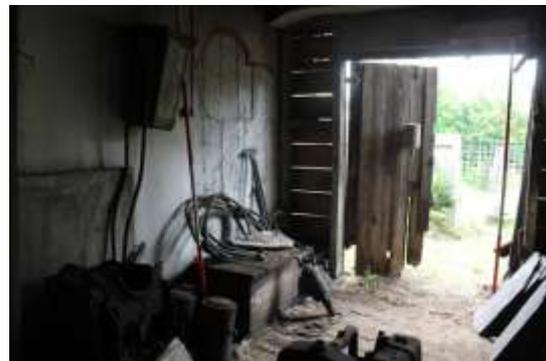
4.110: The Smithy, internal, Store 1, north-east facing



4.111: The Smithy, internal, Store 2, south-west facing



4.112: The Smithy, internal, Store 2, south-east facing



4.113: The Smithy, internal, Store 2, north-west facing



4.114: The Smithy, internal, Store 2, floorboards

Phased Interpretation

Phase 5: The smithy was originally constructed in c. 1900. It appears to have been four bays in length, including the Forge area and a small attached store. These three bays are of even size and suggest a single period of construction. It was rapidly expanded with the addition of a joinery store to the south. It is shown in this form by 1910, and it seems likely the additional store was built within 5-10 years of the original building. The timber-framing of the building is of well-built for a mundane functional structure. The stud walling though, is far more naïve. It suggests that the joiner whom constructed the Smithy was familiar with timber-frame construction typical of the timber-framed tradition of the Northwich Salt District. On the one-hand joiners working on salt works were familiar with using timber to build the pan houses, hence there is a clear display of naïve, pragmatic framing involved in the stud work. The trusses however, may have been reused from other buildings in the area, a key trait of Thompson's pragmatism. The building originally appears to have been clad in wooden boards, as visible surviving in internal walls. These have long since been removed. The openings appear to display an eclectic mix of window and doorway styles suggesting they are salvaged and have been added to and replaced over time.

It is likely the base of the forge is original to this period. Given the precarious state of the chimney of the forge at its current time it seems doubtful that it was originally built this way. However, it does display the cornerstone of Thompson's design: the use of ferrous metal rails in unique and unusual ways to enable brickwork to be held in place.

Phase 7: The Smithy appears to have been expanded with the addition of buildings to the north in the 1960s. The steam engine and associated shed, along with the line shafting were added in the early 1980s. By this time it would appear that the smithy was clad in a mix of original boards and corrugated tin.

Phase 8: The smithy was repaired in 1996. The roof repairs and timber cladding date to this period.

5. THE MACHINES AND SALT VAN

5.1 CRUSHING MILLS AND CUTTING MACHINES

Background

There are two crushing mills (1 and 2), a further crushing machine/ mill (3) and two cutting machines (1 and 2) located on site. The two crushing mills (1 and 2) are located at the northern end of Stove House 4 at the warehouse level, whilst the crushing machine/ mill (3) and two cutting machines (1 and 2) are located in the Packing Area adjacent and to the south-east of Chimney 2.

Description

Crushing Mill 1

Crushing Mill 1 (6329, see BS133, BS134, BS135, BS136, BS137, BS138; CWAC 2012-009; 5.1, 5.2, 5.3, 5.4, 5.5, 5.6), the larger of the two, is located just north of central with machinery that passes upward into the roof louvers. It is built of four massive timbers on each corner, with a further series of timbers north of this which support the drive mechanism.

In its original location in Stove House 2, the Crushing Mill would have been powered by a Steam Engine (see Section 2.3). When the machine was moved to SH4 in the 1950s it was converted to electric power. This electric motor (6427) is now housed on a platform to the east that is badly corroded. This drives the gears of the crushing machine by a series of two belt wheels. The first drive is located adjacent to the Electric Motor on the platform. This transfers to the main drive of the crushing machine.

The main drive on the northern side has a fly and belt wheel, connected to the first of three ferrous metal cogs. Two cogs sit parallel on the lower level with a tooth ratio of 32 and 30. These are then connected to a much larger cog of 72 teeth on an upper level.



5.1: Stove House 4, Crushing Mill 1, c. 1990, south-west facing



5.2: Crushing Mill 1, northern gear mechanism, south-east facing



5.3: Crushing Mill 1, southern gear mechanism, north-east facing



5.4: Crushing Mill 1, southern gear mechanism, north facing



5.6: Crushing Mill 1, lift mechanism, c. 1990, north-east facing



5.5: Crushing Mill 1, bucket lift, west facing

The shafts of these cogs pass through the crushing machine and power a series of four cogs set in pairs on two levels all of 32 teeth. The western cog on the lower level connects via the drive shaft to the 30 tooth cog on the northern side, whilst the eastern cog on the upper level connects to the 72 tooth cog on the northern side.

The upper western cog on the southern side also had a belt wheel that connected to larger belt wheel and drive that powered a belt of buckets linked by ferrous metal chains on either side that feeds from the flue level below to the louver above located on the western face.

Internally the upper part has a hopper with two toothed grinding rollers that turn towards each other. Whole blocks of salt were fed into this via the belt of buckets. The salt blocks passed through the crushing mechanism and were sorted via two lower rollers and emptied on both northern and southern faces where there are pairs of chutes for collecting crushed salt.

The combination of gears has two effects: speed and direction. The upper gears are driven at a lower speed and the gears turn towards each other. The upper mechanism allows the salt to be crushed whilst the lower mechanism separates the salt into two pairs of chutes. The lower speed also drives the bucket lift (at an even lower speed due to the wheel sizes). The lower level is driven at a higher speed and the internal mechanism opposes each other. This means the salt is sorted rapidly internally at a lower level.

Crushing Mill 2

The second crushing mill (Crushing Mill 2, 6330) was located at the very northern end of the warehouse (see BS139, BS140, BS141, BS142; 5.7, 5.8, 5.9). It was built of six large wooden timbers, with a series of three struts supporting it either side.



5.7: Crushing Mill 2, 1980s, north-east facing



5.8: Crushing Mill 2, north-east facing

On the top was a hopper and two chutes collected salt on the southern side. It is unclear if this is the original mechanism or if it had been altered or removed.

The remains of a circuit board were located on the western side. An electric motor was located propped on the southern side. It had been removed from its original location. This powered a conveyor belt that passed into the Packing Area and under Crushing Mill 3 (see below). The

crushed salt passed to the large hopper on top of the machine before passing through two chutes at the base for packing.



5.9: Crushing Mill 2, east facing

Crushing Mill 3

Crushing Mill 3 (6690, see BS139, BS141, BS142, BS143; 5.10, 5.11, 5.12) was associated with Crushing Mill 2 and was integral to it. It was c. 1.0m by 0.8m in size and consisted of a ferrous metal frame, the chipboard and plywood housing had entirely decayed. It had two toothed cylindrical drums that turned towards each other designed to crush block salt. These were powered by two electric motors (only one survives) powered by drive belts. The salt was placed into the crushing drums and was deposited below the machine on a sloping conveyor belt (5.10, 5.14) that carried it up through the northern wall of Stove House 4, where it fed the hopper of Crushing Machine 2.

Cutting Machine 1 and 2

The first, on the eastern side of Chimney 2, Cutting Machine 1 (6493, see BS139, BS141, BS142, BS143; 5.10, 5.11, 5.12, 5.13), had a series of six stainless steel circular saw blades, set within a ferrous metal frame. The saw blades were powered by an electric motor and drive belts (*in situ* on the floor).

Cutting Machine 2 (6494, see BS139, BS141, BS142, BS143; 5.18, 5.19, 5.20) was similar, with two stainless steel circular saw blades, set within a decayed ferrous metal frame. It had a larger work bench, that was originally had a fibreglass surround. Above this was a drum above designed to feed the salt blocks through the saw blades. The stainless steel blades survived undamaged, whilst the ferrous metal frame had largely decayed. The original housing of chipboard had also completely decayed. The saws and drum were powered by an electric motor housed on the floor (now not *in situ*) via belt drives.



5.12: Crushing Mill 3, in 2009, south facing



5.10: Cutting Machine 1, Conveyor for Crushing Mill 3, in 1980s, west facing

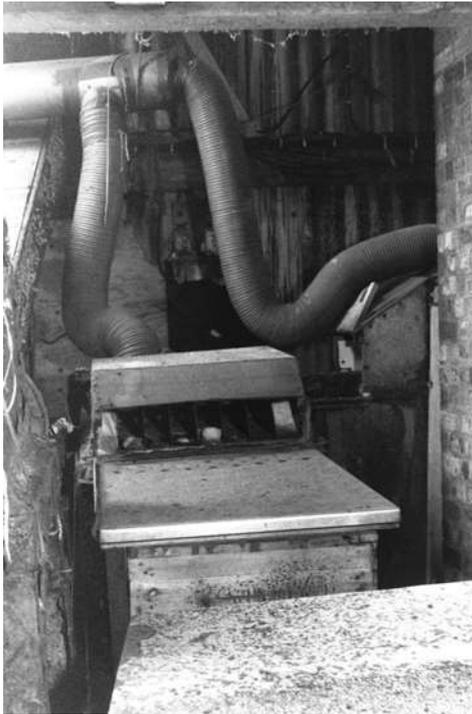


5.13: Conveyor belt for Crushing Mill 3, as it passes to Crushing Machine 2, in 2012 south facing



5.11: Crushing Mill 3, in 1980s, south-east facing

An extractor fan, located on the floor (5139) originally removed the dust from the cutting of the salt. Aluminium sheet extractor pipework (5290) hung from the southern interior elevation (5.11, 5.12, 5.14, 5.21). These passed from the interior of the building out into the Loading Bay area. The rusted remains of the extractor fan can be seen on the Loading Bay platform (see Section 2.4).



5.14: Cutting Machine 1, in 1980s, south facing



5.16: Cutting Machine 1, details of saw blades



5.15: Cutting Machine 1 in 2012, west facing



5.17: Cutting Machine 2, in 1970s during use, south-east facing



5.18: Cutting Machine 2, in 2012, north-east facing



5.19: Cutting Machine 2, in 1989, east facing



5.20: Cutting Machine 2, in 2012, east facing



5.21: Extractor fan in corner of packing area with pipework, east facing

Phased Interpretation

Phase 7: Crushing Mill 1 was dismantled from its original location in Stove House 2 and moved to its current location in the 1950s.⁸⁵ This probably corresponds to its conversion to electric power from steam. It appears to have been used to produce crushed fine salt but also crushed Lagos Salt emphasising the changing market.

Crushing Mill 2 was probably purpose-built for Stove House 4 and therefore dates to the 1950s. It may originally have been a crushing machine. By its later life it probably functioned as a packing machine associated with Crushing Machine 3.

Phase 7: The crushing and cutting machines all date to the latest phase of active use of the works. They demonstrate the wholesale conversion of the works to electric power in the 1960s and 1970s. The machines are probably broadly contemporary with the insertion of the automated skimming mechanism in Pan and Stove House 2 and would have enabled the packing and processing of salt from this part of the works.

Phase 8-9: Little alteration has occurred to Stove House 4 since the acquisition of the salt works by Vale Royal Borough.

⁸⁵ Site visit by Henry Lloyd Thompson, Monday 2nd November 2009

5.2 THE SKIMMING MECHANISM AND DRYING CONVEYORS

Historical Background

The pan house was entirely re-built in the 1970s as part of a plan to upgrade Pan and Stove House 2. This involved the automation of the pan system to allow the automatic removal and drying of salt thus reducing labour costs at the works. Plans show the implementation of a new pan, steel framework, machinery, and conveyor belts (described in detail below). The wooden framework of the pan house was also re-built at this time as shown by plans and cross-sections of this work.⁸⁶

The rusted remains of Pan 2 represent one of the last commercial open pans ever built in Britain. Vacuum salt production had been established for over 50 years and with the opening of the new British Salt Works, in Middlewich in 1967, labour intensive open-pan salt production was in rapid decline.

The Thompson's response to this was one of innovation. They produced an automated salt-scraping mechanism. The designs were similar to those originally developed at the Vacuum Plant in Winsford,⁸⁷ but were in fact based on designs adopted in Germany.⁸⁸ The design of the mechanism was patented in 1972 and it continued to be used to produce Lagos Salt up into the early 1980s. Former workers have recalled seeing the mechanism working in the 1970s, and it was effective in producing salt on a commercial scale for a number of years. An automated drying system was introduced in the Stove House, with a system designed by Henry Thompson.⁸⁹ Plans suggest the ground floor was radically altered. The flues were entirely replaced by a large flue system with electric powered fans. A system of conveyor belts brought salt from the open pan of Pan House 2 and these passed around the room. The electric powered fans drew air over the conveyor belts rapidly drying the salt. This then passed

automatically to the warehouse level above. The building plans are shown as 2.47, Section 2.2.

Description

The salt skimming mechanism is now located at the western end of Pan 2. The pan was very much like an ordinary pan in principal. In fact it appears to have reused part of an earlier pan at the front. The sides were near vertical on three sides, whilst the western side, closest to Stove House 2 was sloped.

Along the northern and southern side ran two rails to which a skimming mechanism was attached (see BS144, BS145, BS146, BS147, BS148, BS149; 5.22, 5.23). When the salt formed and dropped to the base of the pan the salt was automatically raked up from the east to the west of the pan and fell onto a conveyor belt. The mangled remains of the scraping mechanism still survive around the pan.



5.22: Pan 2, with rails for skimming mechanism either side, north-west facing



5.23: Pan 2, northern rails to support skimming mechanism, west facing

The skimming mechanism (5.24, 5.25, 5.26, 5.27) consisted of a large boom (aligned north-south) that ran on two guide rails (6653, 6654) either side

⁸⁶ NOCMS: 1986/3783/10/8

⁸⁷ Fielding 2000, 39, fig. 61

⁸⁸ e.g. Saline Luisenhall, Göttingen, Jonathon Thompson, pers. comm. January 2014

⁸⁹ Jonathon Thompson, pers. comm. January 2014

of the pan. These rails allowed the scraping mechanism to move up and down the pan (east-west). They were powered by a large electric motor on the northern side of the skimming mechanism (5.26). This turned two wheels that were attached to the guide rails. The scraping mechanism itself at its simplest consisted of a large boom. Attached to the boom and dragged along by it were a series of metal paddles (5.286, 5.28, 5.29). The salt when it crystallised out of the brine would fall to the base of the pan. These paddles would scrape salt from the base of the pan as the boom moved along the rails either side. The salt would reach the sloping (western) end of the pan where it would be pulled over a corrugated section before being deposited on an underlying conveyor belt.



5.26: Skimming mechanism, powered by electric motor, south facing



5.24: Skimming mechanism, north facing



5.27: Skimming mechanism, north facing



5.25: Skimming mechanism, south facing



5.28: Skimming mechanism, paddles for skimming salt



5.29: Skimming mechanism, paddles and corrugated pan section



5.30: Skimming Mechanism, Remains of Conveyor 1, at northern end



5.31: Skimming Mechanism, Remains of Conveyor 1, at southern end

The salt was automatically dried on its way around the ground floor of Stove House 2. The salt would fall on the first conveyor belt (1; 6676), that ran north-south under the western lip of Pan 2 (fragmentary remains visible in 5.30, 5.31). It would then pass to the south onto Conveyor Belt 2 (6683, 5.32). At this southern end excess moisture and brine would pass into the ditch south of Pan 2. Conveyor Belt 2 had a mechanism designed to agitate the salt (5.33, 5.34, 5.35). The conveyor

was controlled by a ratchet mechanism that caused it to have a stop-start motion. This would deposit small amounts of salt onto Conveyor Belt 3 (6684).



5.32: Drying Mechanism, Conveyor 2, south-west facing



5.33: Drying Mechanism, Conveyor 2, salt agitator, south-east facing



5.34: Drying Mechanism, Conveyor 2, Ratchet Mechanism



5.35: Drying Mechanism, Conveyor 2, as it drops onto Conveyor 3, north facing

Conveyor belt 3 (6684) and 4 (6685) were designed to dry the salt (5.35, 5.36, 5.37, 5.38, 5.39). They were enclosed with boxes around which hot air was passed. Air was drawn from outside the plant using a large fan (6682; 5.40, 5.41), located in the north-east corner, that passed air from the exterior through metal pipes, in a simple heat exchanger, which was heated by hot gases from the stove in the large central flue (6601; Plate 5.42, 5.43). The air was then drawn over Conveyors 3 and 4, by individual smaller fans (5.44) and via pipework that slowly allowed the salt to dry. A series of plates and brass tubes, riddled the salt for large lumps and spread it out evenly on the conveyor belts (5.55). At the very end was a final vertical salt conveyor (conveyor 5, 6680; 5.56, 5.57) that lifted the salt to the first floor warehouse. This was achieved by a series of material flaps into which salt fell attached to the main conveyor belt.

The new design does not appear to have been able to prevent the economic decline of salt produced by the open pan method. By the mid-1980s Pan House 2 had collapsed. The mechanism and conveyor belts survive as heavily rusted remains.



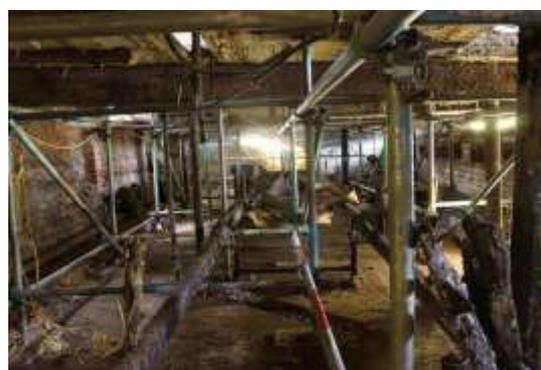
5.36: Drying Mechanism, Conveyor 3, north facing



5.37: Drying Mechanism, Conveyor 3, roller and motor, south facing



5.38: Drying Mechanism, Conveyor 4, south facing



5.39: Drying Mechanism, Conveyor 4, north facing



5.40: Drying Mechanism, Electric Fan, west facing



5.41: Drying Mechanism, Electric Fan, east facing



5.42: Drying Mechanism, large central flue, north facing



5.43: Drying Mechanism, large central flue, detail of heat exchanger



5.44: Drying Mechanism, collapsed fan



5.45: Drying Mechanism, riddling device



5.46: Drying Mechanism, Conveyor 5, warehouse level, north facing



5.47: Drying mechanism, Conveyor 5, flue level, east facing

Phased Interpretation

Phase 5: Pan House 2 was originally built in c. 1895.

Phase 7b: In the 1970s the stove and pan house was radically altered. It is likely that the stove was either entirely replaced or significantly altered in order to run on oil. This involved the replacement of the interior flues (possibly from 6 flues as seen in Stove 3, to 4 as seen here). The eastern façade was replaced and oil fired mechanism inserted.

The pan was also radically redesigned and the automated skimming mechanism dates to this period. Some areas of the pan, the south-east corner in particular appears to retain the original form of the standard pan and this may suggest that this process was not total and involved the patchwork replacement of the earlier pan.

The design of Stove House 2 was radically altered in common with Pan House 2. This involved the removal of the previous flue system on the ground floor and the removal of the majority of the eastern elevation on the ground floor to accommodate a new automated salt processing system (described above). The use of conveyor belts and hot air driven flue systems is highly reminiscent of processing designs used at the British Salt Works, Middlewich to the present days. The British Salt Works was opened in 1967 as a state of the art works and it is possible that the redesign of Stove House 2 was directly influenced or stimulated by this development and the potential economic threat. The automated processing unit was certainly working in the early 1970s as oral historical accounts have been given of it being used. The design may have been Henry Lloyd Thompson's own but was not unique as similar designs are referenced by Tom Lightfoot at the Vacuum Plant, Winsford.⁹⁰ Jonathon Thompson⁹¹ has stated that the design was based on German models found at works in Saline Lussenhall, Goettingen after a visit by Henry Lloyd Thompson and Jonathon Thompson in the 1970s. However, Henry Lloyd Thompson was responsible for the design itself, including the drying system which he designed himself. Plans were submitted as part of the application for the work.⁹²

⁹⁰ Fielding 2000, 39, fig. 61

⁹¹ Jonathon Thompson pers. comm. February 2014

⁹² NOCMS: 1986/3783/10/8

5.3 THE BRINE EXTRACTION APPARATUS

Introduction

The brine extraction apparatus was located in a series of buildings across the site. The equipment was required to pump the brine from the aquifer located over the upper salt bed below the site. Two beds of rock salt exist in Northwich an upper and lower bed. These beds spread from the Northwich town centre in the Baron Quay's area to the north-east of Marston in an area around two miles in diameter. Each bed is from 25.6 to 27.4m (84 to 90 feet) in thickness at Marston and Wincham, divided from each other by 9 to 10m (30 to 33 feet) of marl and marlstone. For example salt was located at Neumann's Mine between 60 feet and 144 feet below Ordnance Datum in the upper bed and 174 feet and 258 feet in the lower bed. The bottom part of the lower bed was found uniformly to be the best quality.

Originally brine was extracted from the brine shaft adjacent to the Brine Tank and Engine House (see above). Subsequently brine extraction was moved to the southern part of the site and was located north of the Pump House, in the Pump House and in the Boiler House. A series of individual elements make up the extraction complex (see 5.48):

- a) The Boiler (in the Boiler House)
- b) The Horizontal Steam Engine No 1 (in the Pump House)
- c) The Electric Motor (in the Pump House)
- d) The Brine Pump (known as the Nodding Donkey)
- e) The Heat Exchanger/ Condenser (in the Pump House)
- f) The Return Water Pump (the Small Cameron Pump, in the Pump House)
- g) The Base and former Tank (north of Nodding Donkey)
- h) The Derrick and the Pump Rod Winch (designed to lift the pump rods)
- i) The Bore-hole, no-Return valve, surge pipe and brine pipes

Additional apparatus was housed in the Pump House:

- a) The Air Compressor
- b) The Windlass

Historical Background

In c. 1938 a new brine borehole replaced the earlier brine shaft, immediately to the north of the Pump House. The Bore Hole is drilled and sleeved with an iron pipe. It was linked to the Brine Tank by a series of Brine Pipes. The Pump Rods survive. An inter-related group of objects existed to draw the brine from the bore-hole. The dating of the borehole is based on evidence from a plan of the associated Steam Engine dated 25th October 1937 and details of its construction in a notebook kept by Alan Kinsey Thompson.⁹³



5.48: Overall diagram of the Brine Extraction Apparatus, Lion Salt Works collection

A nodding donkey pump mechanism was used to extract the brine from the borehole that still stands. The pump was second-hand and repaired through the insertion of a piece of railway rail. Originally a derrick was located over the bore-hole and pump. The Derrick allowed the Pump Rods to be removed enabling the valve to be serviced. The assemblage seems to comprise second hand equipment. The Derrick is made from two pieces of a mast, presumed to be from the Thompson Barge Nautilus. The barge is recorded in a family photograph. A platform between the two uprights allowed access to a pulley over which a rope passed, allowing a vertical pull to be transmitted to raise and lower the pump rods using the hand

⁹³ LSW (not accessioned) West Cheshire Museums, Weaver Hall Museum Collection.

operated Winch located to the north. The rope also passed from the Winch through a pulley anchored to the ground below the brick support for a Water Tank used to hold header water to top up the boiler. The mast pieces had horizontal timber nailed to them to create a ladder allowing access to the platform.

The whole extraction unit was replaced by an Electrical Submersible Pump in the 1960s that used a borehole in the original brine shaft location. In 1996 the derrick was dismantled as it was in poor condition. It has been placed at the eastern side of the site.

The network of brine pipes were inserted between the 1930s and 1960s. They must originally have related to the new borehole. They allowed brine to be pumped from the borehole to the brine tank. They were subsequently moved or reordered during the construction of Pan and Stove Houses 4 and 5. In 2009 a large number of the brine pipes were dismantled as part of the work involved with dismantling Pan and Stove House 5 (see above).

Description

The current description relates to the remains as they existed in 2012-2013 during the current restoration work. Information from historical documents, photographs, and historic descriptions has been incorporated into the current description.

The Boiler (in the Boiler House)

The boiler (6812) is a Cornish (single-flued) boiler. The boiler is dated 1891 and was built by William Lord of Bury. The Lord Brothers were boiler makers from the Barnbrook area of Bury.⁹⁴ It may have been second-hand when acquired.

The boiler was 1.64m in diameter and 4.00m in length (BS156, BS157; 5.49, 5.50, 5.51). The single-furnace door opened to the east, with the surround showing the makers mark 'WILLIAM LORD MAKER, BURY Nr MANCHESTER, 1891'. The fires were set on the fire bars in the furnace tube and the hot gasses passed down the flue to rear of the boiler. The walls of the boiler house (6789, 6800) form the outer brick flues with the hot

gasses passing from the rear of boiler, beneath it to the front then passing back along the sides. These exhausted downwards into an underground flue (6796) that continued to the north-west where it entered Chimney 3 as flue (6768). Against the western gable end the remains of a damper plate (6797) raised via a pulley (6798) controlled the furnace damper mechanism.



5.49: Boiler, west facing



5.50: Boiler, west facing



5.51: Boiler, west facing, furnace door

The steam space in the upper portion of the boiler collected the steam. From here it steam passed to the main steam valve and steam receiver positioned centrally on top of the boiler. This fed

⁹⁴ Lord, J 1903, 58

two pipes: one to the south (6813) that provided steam for the Abraham Lord Engine in the Smithy (see above), the other steam pipe (6799) fed steam to the Steam Engine which powered the brine pump, and the windlass. Along the top of the boiler at the front was a dead weight safety valve and at the rear was the manhole for inspecting the furnace.

The boiler feed water supply was located on the front of the boiler with the pipe (6810) passing to east, overhead, before passing underground across towards the Pump House. In the Pump House this was fed via the Condenser and the Small Cameron Pump from the tank located north of the Brine Pump (see below). The pressure gauge and boiler water level gauge were present but the glass was broken on the latter.

A single ferrous metal pipe (the blow-down, 5.52) extended from the base of the boiler (6814) in a brick lined flue (6818) at its eastern end. This allowed periodic venting of water from the boiler where it had begun to build-up sludge. The flue had been covered by a series of two ferrous metal plates (6815, 6816).



5.52: Boiler, blow-down pipe, west facing

The Horizontal Steam Engine (Number 1, in the Pump House)

The steam engine was one of two steam engines located on the site (BS151, BS152, BS153; 5.53). The other was an Abraham Lord of Rochdale Engine formerly used to power the Crushing Machine in Pan House 2 (See description below). This has been dismantled and is now located in the Smithy (See Smithy description above).



5.53: Schematic of the Pump House Steam Engine

The history of the engine located in the Pump House is not entirely clear. The first engine used on the Lion Salt Works site was located in the Engine House beneath the Brine Tank (See Engine House and Brine Tank above). The gazetteer of 1899 refers to this engine as horizontal engine by Craven Brothers of Manchester. It was described as having a 14 inch diameter cylinder and a 28 inch stroke. It was steamed by a Lancashire Boiler (single-flued) by Galloways of Manchester. Boiler feed water was drawn directly from the nearby canal. This entire complex is clearly extant as the boiler now present is a Cornish Boiler (see Engine House and Brine Tank).

Craven Brothers was a large tool manufacturing company formed in 1853 by the three brothers Greenwood, William and John Craven.⁹⁵ W & J Galloway & Sons was a British manufacturer of steam engines and boilers, based in Manchester, England. The firm was established in 1835 as a partnership of two brothers, William & John Galloway. The partnership expanded to encompass their sons and in 1889 it was restructured as a limited liability company.⁹⁶

⁹⁵ www.mosi.org.uk/media/33870518/cravenbrothers.pdf

⁹⁶ www.themeister.co.uk/hindley/galloways.htm

Unusually there is no maker's name on the Pump House Engine. It has commonly been referred to as the Marcus Allen Engine, including by family members.⁹⁷ Archive drawing showing repair plans from 1910⁹⁸ and two receipts⁹⁹ also show a steam engine was serviced by, or parts were bought from Marcus Allen. These include: 22 feet of 2" shafting, 2½" loose collars, wall bearings, wall brackets and a series of pulleys.

The receipts list Marcus Allen in 1910 as being at 113 Ellesmere Street, Chester Road, Manchester. However, it seems likely that until the c. 1900 the company traded as William Allen and Co based in 1876 at the Union Iron Works, Great Ancoats Street, Manchester. Marcus Allen, a family member, possibly his son, became a Member of the Institution of Mechanical Engineers in 1891, giving his addresses as the Union Brass and Iron Works, Great Ancoats Street and Phoenix Iron Works, Jersey Street, Manchester. Marcus Allen is listed as brass founders and general engineers, of Vernon Engineering Works, Elsinore Road, Old Trafford, Manchester by c. 1900. The company was established sometime after the turn of the century. It seems likely that William Allen and Co was the same company, in the absence of other suitable candidates in the relevant trade directories.¹⁰⁰

There is no conclusive evidence that the Pump House engine was made by Marcus Allen of Manchester and there has been a suggestion that it was made by a local company such as Bates Iron Foundry, Northwich but with no corroborative evidence.¹⁰¹ Another possibility remains: that the engine like much of the equipment associated with the Nodding Donkey was derived from one of the Thompson's former Weaver Flats.

⁹⁷ Donald Inshall Associates 2005, Appendix 2

⁹⁸ Plans of Repair Work, Marcus Allen, Engineers, of Manchester, reference number 2494, dated September 9th, 1910, NOCMS: 1986/3783/4/9

⁹⁹ Receipt [Fragment] from Marcus Allen, Mechanical and Chemical Engineer, Brass Founder etc, dated September 6th 1910; Receipt [Fragment] from Marcus Allen, Mechanical and Chemical Engineer, Brass Founder etc, dated October 8th, 1910.
¹⁰⁰

[http://www.gracesguide.co.uk/William_Allen_\(Manchester\)#Great_Ancoats_Street_Premises;](http://www.gracesguide.co.uk/William_Allen_(Manchester)#Great_Ancoats_Street_Premises)

http://www.gracesguide.co.uk/Marcus_Allen_and_Sons

¹⁰¹ Donald Inshall Associates 2005, Appendix 2

It is clear that the Pump House steam engine was clearly second hand as detailed plans were produced for its rehousing and conversion to utilise the pump mechanism known as the 'nodding donkey'. Detailed plans for the borehole pump were produced in 1937.¹⁰² These included plans for the rehousing and conversion of 'an existing engine' to power the new Pump Mechanism dated November 8th 1937. Overall the evidence suggests that the Pump House engine was brought to site.

Images from the 1980s reveal that the engine was painted green and red.¹⁰³ The engine was restored in the summer of 1990 by '8E Association' Restoration Group (5.54).¹⁰⁴



5.54: The Pump House Engine, immediately after restoration in 1990

Description

The horizontal steam engine (6775; BS151, BS152, BS153; 5.55) was tied-down to the large concrete base (6767) by a series of six bolts. The steam engine was orientated north-south, and directly drove the mechanism of the brine pump. Detailed recording and description of the steam engine has been undertaken repeatedly during the lifespan of

¹⁰² Drawing - General Arrangement of Proposed Borehole Pump, Messrs Ingram Thompson and Sons Ltd, Lion Salt Works, Marston, Timmins and Sons Ltd, Dated 17th August 1937 NOCMS: 1986/3783/4/24; Drawing - Gearing for Brine Pump for Messrs Ingram Thompson and Sons Ltd, dated October 25th 1937; Drawing - Plans for the conversion of the Steam Engine to serve the Borehole Pump by JB [draftsman], dated November 8th 1937, NOCMS: 1986/3783/10/6

¹⁰³ Photographs by Matt Wheeler, Lion Salt Works Collection, undated, suggested to by c. 1980s

¹⁰⁴ News-cutting Northwich Chronicle, undated; Document detailing lending of Pump House Key, Andrew Fielding, LSWT to Micheal Lenz, 8E association, dated 21st August 1990.

the project. The following brings together these descriptions. It comprised the following elements:

The archive drawing shows it to have been repaired by Marcus Allen, Engineers, of Manchester, (reference number 2494, dated September 9th, 1910). The drawing states it was designed to be capable of 120 rpm. The video taken in the 1980s suggests it ran at c. 60 rpm with the output speed to the pump reduced to approximately 12 rpm/strokes per minute.¹⁰⁵



5.55: Pump House Steam Engine, north-west facing



5.56: Pump House Steam Engine, south facing

The engine is a horizontal single cylinder double acting engine with a grid type slide valve (5.56).

The cylinder is 8 inches (200mm) in diameter and the stroke length is 16 inches (406mm). ‘Double acting’ means that steam is introduced alternately at either end of the cylinder, thus giving two power strokes for each revolution of the engine. The manual engine stop valve has a secondary ‘Pickering Type’ governor (5.57) control to maintain constant speed as the load varies. This would have been unnecessary when motor driven but has been reinstated to enhance the interpretation of the engine. Lubrication is by gravity wick-fed oilers all of which remain in place. However the cylinder oiler has been lost since the last refurbishment. It was extant in the 1980s.¹⁰⁶



5.57: Pump House Steam Engine, governor detail, north facing

The flywheel (5.58) is 59 inches in diameter. It is mounted on a large brick base 6770, with a large belt-driven wheel, 60.5 inches in diameter (6776), associated with the electric motor to the east.

The main reduction gears are double-helical or herringbone gears, rather than flat teeth (also known as Citreön gears due to the early involvement of Andre Citreön in their production, 5.59). They are 64 inches and 12 inches in diameter respectively. The larger gear connects to

¹⁰⁵ Mitchell 2010, *The Engine*

¹⁰⁶ Mitchell 2010

a disc crank (5.60) and from this to a horizontal wooden connecting rod (with a stroke of 42 inches, 5.61, 5.62). This connected to the pump rod of the Brine Pump via a bell crank with an off-set counterweight (see below). The double-helical gears, disc crank and connecting rod were added as part of the redesign (shown on plans dating to 1937) in to use the engine to power the Brine Pump. They were tied down by a series of six bolts to the concrete base (6767). The helical gears passed through a plywood construction box containing oil that acted as an oil bath (6788). It contained viscous residues.



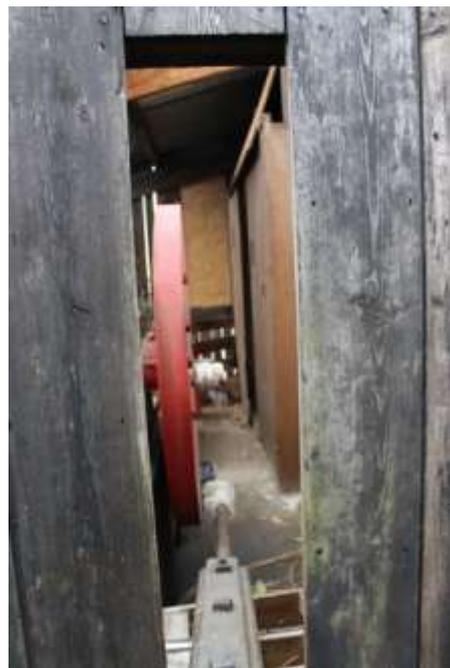
5.58: Pump House Steam Engine, Flywheel, north facing



5.59: Pump House Steam Engine, Citreön reduction gears, north facing



5.60: Pump House Steam Engine, Crank Disc, west facing



5.61: Pump House Steam Engine, Wooden Connecting Rod, south facing

The steam engine was originally fed by a series of steam pipes that passed from the boiler (see above). The waste steam was vented via pipe (6781) to the heat condenser (see below). Subsequently this was replaced by a system of compressed air from the compressor (6778) by a pipe (6786) inserted in 1994 to replicate steam.



5.62: Pump House Steam Engine, Crank Disc and Wooden Connecting Rod, north facing

The Electric Motor (in the Pump House)

The steam power for the engine had been replaced in the 1960s by an electric motor (5.63, 5.64). Installed when the electrical submersible pump was installed and this engine became the back-up pump and visitor display.¹⁰⁷

The electric motor is located on a separate concrete base (6765) that was sat on the earth floor.

The electric motor is a three phase 20 horse power induction motor by Brooks. The installation probably followed getting a high voltage supply onto the site. The electric motor drove the steam engine through the addition of a set of shafts, bearings and wheels as a first step speed reduction from the motor speed down to the pumping rate.¹⁰⁸ These belt-driven wheels were 7 inch, 28 inch and 16 inch in diameter respectively before powering the second belt-driven wheel, 60.5 inches in diameter (described above), on the same axle as the flywheel.



5.63: Pump House Electric Motor, west facing



5.64: Belt driven wheels, west facing

The Brine Pump

The brine pump, known colloquially as the 'Nodding Donkey' was erected in c. 1937 contemporary with the new bore-hole. Detailed plans for the borehole and pump were produced in 1937 by Timmins and Sons Ltd.¹⁰⁹ The plan shows the general arrangement of the borehole to a depth of 142 feet 6 inches. The pump mechanism has not been closely adhered to in practice and the brine pump appears to be second-hand and repaired through the insertion of a piece of ferrous

¹⁰⁷ Donald Insall Associates 2005, *Appendix F, No 11*

¹⁰⁸ Mitchell 2010, *The Electric Motor*

¹⁰⁹ Drawing - General Arrangement of Proposed Borehole Pump, Messrs Ingram Thompson and Sons Ltd, Lion Salt Works, Marston, Timmins and Sons Ltd, Dated 17th August 1937, NOCMS: 1986/3783/4/24

metal rail. The pump continued in use powered by the steam engine until the 1950s or 1960s. At this time a general process of electrification of the works occurred. The borehole was replaced by an Electrical Submersible Pump in the 1960s¹¹⁰ (see elsewhere), that adopted a new borehole, located south of the brine shaft, engine house and brine tank.

Description

The whole complex was built on a raised platform of earth (1018, see above) that represented the former remains of a fishery (or common) pan. At the southern end the Horizontal Steam Engine and Pump House had been built over this bank (see above).



5.65: Brine Pump, 'Nodding Donkey', east facing



5.66: Brine Pump, 'Nodding Donkey', east facing

The Nodding Donkey (1023; BS108, BS111, BS112, BS150; 5.65, 5.66, 5.67, 5.68, 5.69, 5.70) was located shortly north of the steam engine on this earth bank. Two hand-made red brick bases in English Garden Wall bond (1021, 1022) set side by side supported the ferrous remains of the Nodding Donkey. The brine pump was built on two wooden

bearer beams. The metalwork of the pump ran between the bases with the borehole located to the north. The connecting arm to the steam engine entered the Pump House directly to the south.

The brine pump, itself, is of the vertically reciprocating type with rods reaching down a casing or riser to the brine reservoir. The plunger action of the pump is achieved by a link from the engine which pushed the vertical leg of the pump to and fro, thus converting rotary motion to reciprocating. At the foot of the rod would have been a plunger with non-return valves. These would allow the brine to pass through the plunger on the down stroke to close on the upstroke, thus lifting the brine. In this way a column of liquid was raised and spilled from the well head through a side flange to a non-return valve and then through the discharge pipe-work to the brine tank. Close to the well head a vertical stand pipe was set. The air trapped in this pipe acted as a cushion to the pulses of the pumping action, thus evening out the flow and preventing 'hammer'.¹¹¹



5.67: Brine Pump, 'Nodding Donkey', west facing

¹¹⁰ Andrew Fielding in DIA 2005 Conservation Management Plan, Lion Salt Works, Appendix F, No 9

¹¹¹ Jim S Mitchell 2010 Report on the Conservation of the Brine Extraction Complex, The Brine Pump



5.68: Brine Pump, 'Nodding Donkey', south facing



5.70: Brine Pump, 'Nodding Donkey', Pump Rod Detail



5.69: Brine Pump, 'Nodding Donkey', Pump Rod Detail

The pumping shaft of the Nodding Donkey hung directly over the bore-hole (1024, see below). The brine pump, well head and other parts survive extant *in situ* or out of situ but close by. The pump rod hanger-to-spear bearings are stored in Stove House 2.

The Return Water Pump (The Small Cameron Pump, in the Pump House)

The small Cameron pump (6777; BS154; 5.71, 5.72, 5.73, 5.74) was used to pump return water to the boiler from the water tank via the heat exchanger. It was a single-cylinder, inverted, vertical, rotative, boiler-feed pump with 'banjo' type linkage built by John Cameron of Manchester. John Cameron Ltd of Manchester were manufacturers of Steam Pumps from Oldfield Road Iron Works, Oldfield Road, Salford. They began manufacturing in 1852.¹¹²

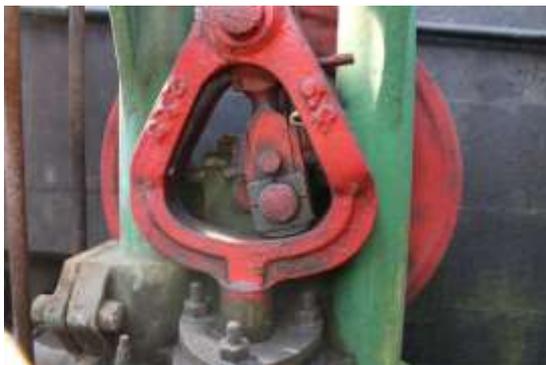
The cylinder has a bore of 5 inches and stroke of 6 inches and the pump (at the base) are directly linked via the banjo casting. To improve the smoothness of the pump delivery, a flywheel is linked to the banjo via a short connecting rod and the crank rotates within the empty space in the centre.¹¹³

¹¹² [http://www.gracesguide.co.uk/Cameron_\(of_Manchester\);](http://www.gracesguide.co.uk/Cameron_(of_Manchester);) A-Z of British Stationary Engines by Patrick Knight. Published 1996. ISBN 1 873098 37 5

¹¹³ An identical example, but larger is visible at the Northern Mill Engine Society Collection at Bolton Steam Museum, <http://www.nmes.org/boilers.html>; another similar example can be seen at Kew Bridge Steam Museum, Green Dragon Lane, Brentford, Middlesex



5.71: Small 'Cameron' Water Return Pump



5.72: Small 'Cameron' Water Return Pump, banjo casting



5.73: Small 'Cameron' Water Return Pump, Makers Plaque

The pump has a maker's plaque with the inscription 'JOHN CAMERON PATENTEE & MAKER, MANCHESTER'. A steam pipe feeds steam directly from the boiler, whilst a further pipe exhausts steam to the condenser. The pipe from the condenser (6782) then allows water to be returned to the boiler via pipe (6783). A further pipe (6787) survives under the walkway and carries under to the south-east towards the Boiler House. Here it may connect with pipe 6810, the water-feed for the boiler.



5.74: Small 'Cameron' Water Return Pump, flywheel

The Heat Exchanger/ Condenser (in the Pump House)

The heat exchanger is located north of the Steam Engine (5.75). This was used for pre-heating return water stored in the water tank for pumping into the boiler. (Alternatively it pre-heated mains water prior to pumping to the boiler). It consisted of a metal cylinder, 12 inches in diameter by 46 inches high, with internal tubes carries exhaust steam from the steam engine (via pipe 6781). Water from the tank (see below) passed into the condenser from underneath. It was then drawn off via pipe (6782) to the small Cameron pump (6777) and from there passed to the boiler (6812).



5.75: Pump House, Heat Exchanger/ Condenser

Tank and Base

The tank and base were part of the complex associated with the Brine Pump built in c. 1937. The tank is shown on images dating to the 1950s as a circular metal structure (5.76).¹¹⁴ The function of the tank is not entirely clear but a similar tank has been described for an Abraham Lord Engine, located at the Sunbeam Works, Wincham that was leased to the Thompson family until 1975. It is described so:

*A 6" offset near the top of the rising main fitted with non-return valve delivers the brine into a receiver made from an old Lancashire boiler with flues removed and set on a brick pillars about 10 feet high and from this it flows into the reservoir below which is about 150 feet square and 20 feet deep the sides being of finely set blue engineering brick and with steep sides inward batter, from the reservoir the brine flowed by gravity to the salt works and was fed into the pans for evaporation as required the distance being about half a mile.*¹¹⁵

The description suggests that brine was initially raised into a receiving tank before redistribution to

the main brine tank. The description of a reused Lancashire boiler for the tank would fit closely to the images that show a circular tank. However, it would appear more likely that this was a header tank for the boiler fed via the steam engine condenser.¹¹⁶ The condenser is extant in the engine house (discussed above).



5.76: Tank and base in 1950s, south-west facing



5.77: Water tank base, north facing

¹¹⁴ Black and White Image, Lion Salt Works Collection, date unknown, assumed to pre-date c. 1965 due to its orientation from the location of the rebuilt Stove House 5

¹¹⁵ Bebbington, A P, 1974, 10-11

¹¹⁶ Mitchell 2010, *The Header Tank*

The surviving remains consist of a tall machine-pressed brick base about 2.2m high in an H-plan (BS108, BS111, BS112; 5.77). This was located north of the Brine Pump (the Nodding Donkey) and related to the former support for the header tank for the boiler. The tank has been removed and is now lost. The brick base had begun to collapse in places.

The Bore-Hole, Brine Pipes, No-Return Valve and Surge Pipe

The borehole was excavated in 1937. Drawings exist which detail the general arrangement of the bore-hole pump (see above).¹¹⁷ The bore-hole was drilled to a depth of 142 feet 6 inches. It was subsequently double sleeved to a depth of 61 feet with 6 inch bore rising main tubes, with narrower 5 ½ inch bore tubes at the base to 130 feet 9 inches. The well head is recorded on the drawings as being 7 feet from the surface but in reality protrudes out of the ground to take the pump rods. A brine meter recorded the volume of brine extracted. The bore-hole was capped with a ferrous metal well-head (1024; BS108, BS111, BS112; 5.78).



¹¹⁷ Drawing - General Arrangement of Proposed Borehole Pump, Messrs Ingram Thompson and Sons Ltd, Lion Salt Works, Marston, Timmins and Sons Ltd, Dated 17th August 1937, NOCMS: 1986/3783/4/24

5.78: Bore Hole, south facing

It was directly connected to the series of brine pipes (1025, see below). The brine pipes (1025; BS108, BS111, BS112; 5.79, 5.80, 5.81, 5.82) were made of cast-iron and carried the brine to the Brine Tank. These were cast-iron with collars at either end that initially turned east for a short length in which was located the no-return valve and surge pipe. The no-return valve and surge pipe, the vertical length of pipe, were designed to prevent back-surge from the pump and bore-hole. From here they passed north-south in the direction of the Brine Tank for c. 14m mounted on a series of square pillars made of machine pressed yellow bricks (1046, 1047, 1048, 1049, 1050).



5.79: Brine Surge Pipe and Brine Pipe, north facing

A junction indicated a branch (1027) that passed to the north-east where it probably connected with the pipework of Pan House 5. The other passed to the north around Stove House 5 and joined cast-iron brine pipes (1003, see Brine Tank above). Originally it passed around the western side of Stove House 5 and emptied into the Brine Tank. Much of this arrangement had probably been altered. As the pipes entered the Brine Tank a second surge pipe had been inserted. This corresponded with the location of the last bore-

hole excavated in the 1960s and used with a submersible pump. This pipework was dismantled in 2009 and subsequently in 2012 prior to excavations close to the Brine Shaft.



5.80: Brine Pipe, north facing



5.81: Nodding Donkey, Brine Pipe connections



5.82: Nodding Donkey complex, Brine Pipe connections

The Derrick

The derrick formed part of the rebuilt brine extraction mechanism around the new bore hole (see above, 5.83, 5.84), and thus dates to the 1930s or 1940s. The Derrick is made from two pieces of mast stated to be from the Thompson's Weaver Flat, Nautilus.¹¹⁸ This seems unlikely as the structure dates to the 1930s and the Nautilus was sold in 1890. However, it is possibly from another Weaver Flat.



5.83: Derrick, in the mist, north-east facing, in 1989

The earliest images of the derrick *in situ* date to the late-1950s prior to the construction of Stove House 5.¹¹⁹ By the early 1990s the derrick had partially collapsed. The eastern leg had decayed and the western leg had collapsed. The western leg was taken down by crane in the early 1990s and was stored adjacent to the Smithy (5.85, 5.86).

¹¹⁸ Andrew Fielding in DIA 2005, Appendix F, No 2. The origin of the supporting evidence for this statement is unknown but probably relates to Oral Historical reference from the Thompson Family.

¹¹⁹ Black and White Image, Lion Salt Works Collection, date unknown, assumed to pre-date c. 1965 due to its orientation from the location of the rebuilt Stove House 5



5.84: Derrick, and Pump House, south-west facing, early 1990s



5.85: Collapsed remains of the Derrick in early 1990s, west facing

The derrick allowed the Pump Rods to be removed enabling the valve to be serviced. The entire assemblage seems to comprise second hand equipment.

The derrick was a bipod structure; in pitch pine approximately 10.5 metres tall. It carried an access ladder on the north side, a small platform and a suspended pulley block located directly over the well. The derrick was not free standing and required a guy wire rope at right angles to its stance. This 7/8" diameter rope (70mm circumference) was secured on the far side of the engine house and at the opposite end of the raised

*pumping area, beyond the winch location. The rope was angled at approximately 90 degrees across the top of the derrick and was tensioned using turnbuckles at ground level. The rope is partially extant but no longer fit for purpose.*¹²⁰



5.86: The western stand of Derrick during removal to in front of the Smithy, 1990s

The guy cable still survives and is visible on the southern side of the Pump House as a length of cable hanging from the roof (6742). A diagonal strut (6755) still protrudes from the north wall of the Pump House. The western leg has been stored on site (on the eastern side of the site adjacent to the temporary white building) and is in good condition but has begun to deteriorate. The eastern leg is stored east of the smithy and has decayed beyond repair.

The Hand Winch

To the north of the brick base were the remains of the ferrous metal hand winch (1029, 1030, 5.87, 5.88). The hand winch was contemporary with the derrick and part of the mechanism designed to allow the removal of the pump stack from the borehole. The winch has collapsed due to the failure of the timber elements but seems to be largely extant. The wire cable is extant but has

¹²⁰ Mitchell 2010

frayed. The winch rope ran horizontally from the winch, beneath the header tank brickwork arch to a floor mounted snatch block. The rope then passed upwards to the suspended pulley on the top of the derrick and then down to the well head below.



5.87: Hand Winch, north facing



5.88: Hand Winch, east facing

The Air Compressor

A substantial compressor and air receiver built by Atlas Copco were installed in 1994 by 8E Restoration. The intention was to supply the engine and windlass with compressed air and so simulate steam operation.

These are located in the north-west corner of the Pump House fixed to the ground on concrete bases (5.89, 5.90). The large grey compressor unit, 1.80 x 0.80m and 1.10m high (6778), connects to the cylindrical air unit (6779). Compressed air is then passed via a 40mm diameter pipe (6786) to the steam box of the steam engine.



5.89: Atlas Copco Compressor Unit, east facing



5.90: Atlas Copco Compressor, east facing

The Windlass

The duplex windlass was made by Wilson's of Liverpool, visible on the machinery as a maker's mark. The date of the windlass is unclear but it has been suggested it originated, like the mast for the derrick from the Thompson's Weaver Flat the Nautilus.¹²¹ A similar windlass is visible at the fore of the Nautilus on a photo of c. 1890.¹²²

John H. Wilson and Co were a large engineering firm established in 1860. They were located at

¹²¹ Andrew Fielding in DIA 2005, Appendix F, No 23, see discussion above.

¹²² Photograph of Nautilus on River Weaver with Thompson Family in aft, boat registered to Henry Ingram Thompson, Liverpool, date 1888, Cheshire Archives

Dock Road, Seacombe, Birkenhead, and Bankhall Engine Works Sandhills, Liverpool. The Bank Hall Engine Works were described in 1891:

*These works, the property of Messrs. John H. Wilson and Co., are situated near Sandon Dock, and adjacent to the Sandhills Station of the Lancashire and Yorkshire Railway. They are employed in the manufacture of steam winches and cranes, steam crane excavators, and concrete-mixing machines, which have been extensively used in the construction of the Manchester Ship Canal.*¹²³

They were advertising steam winches, windlasses, deck cranes, donkey pumps in 1905.¹²⁴



5.91: Steam Windlass, west facing

The windlass was set on a base in the south-east corner (BS155; 5.91, 5.92, 5.93). It is effectively two separate units on a single frame with each side able to be operated independently by the use of a three way valve.¹²⁵ Each unit was driven by single mounted cylinders at either end of the unit

¹²³ The Practical Engineer published by the Technical Publishing Company. Volume V. 1891.

http://www.gracesguide.co.uk/John_H._Wilson_and_Co

¹²⁴ Mechanical World Year Book 1905. Published by Emmott and Co of Manchester. Advert p4,

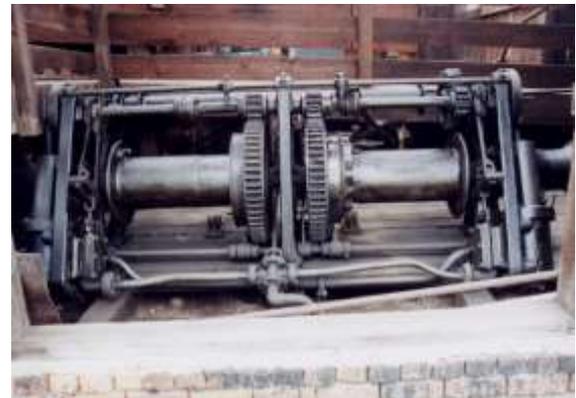
http://www.gracesguide.co.uk/John_H._Wilson_and_Co

¹²⁵ Mitchell 2010, *The Windlass*

connected to a circular crank. Double eccentric rods were located adjacent to this (5.94). These drove two drums for the cable (5.95).



5.92: Steam Windlass, south-east facing



5.93: Steam Windlass, north facing, early 1990s



5.94: Steam Windlass, piston and eccentric

A hand clutch allows the crank shaft to disconnect (5.96). A series of two plain toothed reduction gears were located at one end with a ratchet mechanism at the other end. These allowed the steam driven power to be manually overridden by a hand windlass (still present). Two friction footbrakes allowed the slowing of the windlass to suit.

The windlass would allow two cables to draw the wagons up the small mineral track with fine adjustments allowable by independent use of the two drums.



5.95: Steam Windlass, drums and gears



5.96: Steam Windlass, clutch mechanism, south facing

Phased Interpretation

Phase 7a: The complex as a whole dates to the late 1930s. It would appear that the borehole, brine pump (Nodding Donkey), steam engine and boiler were all erected at this point. They replaced the south-east fishery pan which was abandoned and reused as a platform. The original pump house was also constructed at this time and is visible on the aerial photographs from 1947. It would appear likely that other pieces of the apparatus were set up at this time. These include the tank and base, the Heat Exchanger/ Condenser, and the Return Water (Cameron) Pump. Of these items all appear to be recycled. The steam engine, Cameron pump and boiler all date to the late 19th or turn of the 20th century. It is therefore possible that they were bought from other salt works as they were abandoned. The tank appears to have been part of a recycled Lancashire boiler originally, but is now lost.

The derrick and pump rod winch is less easy to relate to a specific period. It contains two masts or part of a derrick – a crane mechanism from a Weaver Flat possibly the Constance. The Constance was scuppered in the early 1950s, as transport moved from river to rail and road. This would suggest a date not long after the drilling of the borehole. The earliest dateable chronology is in the 1950s when photos show the complex. However, some form of system would be required to remove the pump rods and suggests that all are original. It is not impossible that they are derived from another Weaver Flat.

The windlass does not appear to be original to the complex and was possibly also from a decommissioned Weaver Flat. It may have been used to draw carriages up the mineral railway line from sidings further down. The nature of this system is not clear. It would have had to use pulleys as the mineral railway line curves around the end of the plots on Ollershaw Lane and Cross Street to the south, and does not take a straight line. There is also no clear way to haul the carriages to the front of Pan House 3 and 4. It would seem as likely that this was a supplementary system, with carriages shunted into place.

The brine pipes may in part be original but it is very likely they have been continually modified during the course of the works. They would be subject to a lesser degree of corrosion than the pans. This was because they were subject to less saturated brine, and this may explain why they survive so well. Alternatively they may have been replaced continually, and very little original pipework survives. Elsewhere on site it has been noted that buried brine pipes are in remarkably good condition considering their exposure to brine.

Phase 7b: The complex was modified in the 1960s and 1970s. It is clear that the Electric Motor was added at this time to allow supplementary power to the brine pump when steaming was not possible. The date of the motor suggests that it dates to the 1970s and brine was being pumped from the borehole south of the Brine Tank from the 1960s. It would be unlikely that the expense of a new motor was entirely necessary, but it did allow an alternative brine source to be tapped.

Phase 8: The restoration in 1990 added the compressor to provide the engine with compressed air as opposed to steam power as part of the demonstration.

5.4 THE ABRAHAM LORD, ROCHDALE STEAM ENGINE

Historical Background

The steam engine located in the Smithy has a complicated history but appears to be original to the works. It was initially located to the north of Pan 2 in a wooden shed by the canal. The remains of a brick and concrete machine base with tying down pins survive intact at this location.

It was designed by Abraham Lord of Rochdale and was one of a pair of similar engines. The other engine was originally located at the Sunbeam Works, Wincham. Both engines were offered for sale as museum exhibition pieces by Henry Thompson in the 1970s. However, the example from the Sunbeam Works was scrapped prior to purchase and the one from the Lion Salt Works bought for the sum of £50 by Cheshire Libraries and Museums with a grant from the Science Museum, South Kensington, London. The steam engine was subsequently dismantled in 1975 and taken from the Lion Salt Works to the store at Wardle by Dorothea Restoration Ltd of Buxton.¹²⁶ It was not described in detail or photographed prior to removal but notes as part of a survey by Colin Bowden were made.

*Horizontal single cylinder engine by A Lord and Co, Rochdale, c. 1880s, stopped by 1973 and derelict in 1974, cylinder c. 9 inch x 20 inch stroke, slide valve, unknown steam pressure, pickering governor, flywheel 6 foot diameter, non-condensing, belt drive from fly wheel driving grinder. Very rusty when seen April 1974. Located in wooden shed alongside canal. Associated Cornish Boiler: Salt Union Ltd 1895.*¹²⁷

It was stored here until 1980 when it was returned to the site on a loan arrangement¹²⁸ to the Thompson family to be incorporated into the

¹²⁶ Purchase Grant from Fund for the preservation of Technological and Scientific Material, dated 21st October 1975. Invoice No 0158 re: Dismantle and transport Abraham Lord Steam Engine to Store at Wardle, dated 3rd November 1975

¹²⁷ Notes made by Colin Bowden on Steam Engines in Marston and Wincham 1974-1975.

¹²⁸ Letter dated 19 November 1980 from Dennis F Petch, Assistant Director Museums, Cheshire County Council to J C Robinson, assistant Keeper, Science Museum, London

‘working museum’. It was rebuilt by Henry Thompson and placed in the cart shed adjacent to the Smithy in order to demonstrate the line shaft, saw and press (see 5.97 for the layout details). It operated in this way until the mid-1980s when the works closed.



5.97: Schematic of the layout of the Smithy Steam Engine



5.98: The Smithy Steam Engine, in the Cart Shed, west facing in 1990



5.99: The Smithy Engine, after removal of the Fly Wheel, west facing, in 1990

It subsequently remained unused for a number of years with a view to repairing the machine. ‘8E Group’, locomotive restorers, began the process of restoring the mechanism on Saturday 10th March

1990, by stripping down and labelling the engine (see 5.98, 5.99, 5.100).¹²⁹ It has remained in the Smithy store unrestored since this period. A photographic record of the Smithy Engine was taken at this time and remains in the archive, with scanned copies of the most significant photos.



5.100: The Smithy Engine, removing the Fly Wheel, in 1990

Arthur Bebbington produced a description of a very similar engine from the Sunbeam Works, Wincham, another works run by the Thompson family that closed in 1972-1975. It acted as the steam pumping engine as opposed to running machinery. It was described in detail in 1974 prior to its sale for scrap in October/ November 1974.

Until some 5 years ago [c. 1969] this concern [Messrs Thompson Ingram & Co, of the Lion Salt Works] also worked the Sunbeam salt works, a works of some six full size pans and situated at Wincham about a mile from the Lion Works and until its closure the brine was supplied to the works by a deep well pump driven by a horizontal steam engine supplied with steam by a 20ft by 6ft 6inch Cornish boiler with a working pressure of 30psi, which with an evaporation of around 1800 lbs per hour was ample to ensure easy and economical firing on the rather inferior slack used by most salt works for pans and boilers.

The engine made by Messrs Abraham Lord, Rochdale, of whom little appears to be known, is a horizontal single cylinder slide valve type of around 9 ihp, with a cylinder of 10" diameter, the piston rod driving through a crosshead working in 4 bar slides via the connecting rod to a disc crank giving

¹²⁹ Letter dated 9th March 1990, Andrew Fielding, LSWT to Colin Worrall, 8E Association chairman, associated press release

a stroke of 23", the crank shaft in addition to the eccentric working the slide valve and a fly wheel 68" x 9" also carries a herring bone pinion gear of 25 teeth which in turn drives a lay-shaft on the engine bed immediately in front of the crank shaft through a herring bone gear of 126 teeth giving a ratio of 5 revolutions of the engine to 1 stroke of the pump.

A disc crank on the end of the lay-shaft giving a stroke of 46" is communicated to the pump by a large wooden rod strapped with iron and working to a massive bell crank situated outside the engine house and to which is fitted a balance bob in the form of a large rectangular piece of cast iron held by two pieces of rail bolted to the bell-crank, this arrangement assisting the engine on the rising or delivery stroke of the pump.

From the nose of the bell-crank an iron pump rod works through a gland fitted to the top of a 6" standpipe up which the brine is lifted and in which the rod works terminating in a plunger fitted with a clack valve and working in a gunmetal pump barrel of 4" diameter the foot-valve of the pump is approximately 125 feet below ground level and the plunger is made tight by hydraulic cup leathers.

The total depth of the well shaft is approximately 130 feet and it was found that the plant worked most economically and most easily without shock or shudder at 35 strokes per minute on the engine to 7 strokes on the pump and at 7 gallons per stroke gave an output of 50 gallons per minute and 3,000 gallons per hour.

A 6" offset near the top of the rising main fitted with non-return valve delivers the brine into a receiver made from an old Lancashire boiler with flues removed and set on a brick pillars about 10 feet high and from this it flows into the reservoir below which is about 150 feet square and 20 feet deep the sides being of finely set blue engineering brick and with steep sides inward batter, from the reservoir the brine flowed by gravity to the salt works and was fed into the pans for evaporation as required the distance being about half a mile.

The steam from the Cornish boiler is supplied to the engine stop valve by a 3" cast iron steam main in which is also fitted the governor throttle valve

operated by an attractive rod pattern governor which is driven through bevel gearing from a toggle on the crankpin. The exhaust steam passes through a feedwater heater fixed in the roof space above the boiler and from there is passed through a coil fixed in the Lancashire boiler receiver where it is condensed and also slightly warms the brine.

The condensate then falls into the tank fixed at ground level and, after the oil has been skimmed from the surface by the engineman for reuse in the engine lubricators, was returned to the boiler as feedwater by a steam driven Cameron feedwater pump. Although the engine cannot be regarded as a condensing engine it may be that some of the back pressure was removed by the condensing coil. From all points of view it would appear that the plant was fairly economical and embodied the best practices of its period and was easily worked in its entirety by one man.

The entire plant was installed in its present position around 1885 and thus gave over 80 years relatively trouble free service which is a great tribute both to the makers and the operators and it is unique in being the last remaining unit complete in all details and typical of the great number used in Cheshire salt fields over 100 years ago.¹³⁰

Alexander Petrie & Sons, Ironfounders & Engineers, were the first Rochdale firm to actually manufacture a steam engine. Other firms in Rochdale were also building steam engines, including David Howarth, C. & J. Nuttall and Abraham Lord – with William McNaught, Petrie's former factory superintendent and chief designer competing too.¹³¹ Abraham Lord was among the makers of smaller [steam engines] that also included Earnshaw, Barlow and Holt, William Todd, David Howarth, C&J Nuttall, but in larger engines from 1860 there was only one serious competitor of Petries and that was the firm established just before that year by William McNaught Senior.¹³²

¹³⁰ Bebbington 1974, 10-11

¹³¹ www.artsandheritage.link4life.org/index.php/discover/local-history-online/trade-industry-and-transport/engineering

¹³² *Steam Engine Building in Rochdale* by G B Williamson, M.I.Mech.E. Read, 19th November 1943, transcribed from original by Stanley Graham, accessed

Description

The Abraham Lord of Rochdale steam engine, is now dismantled and survives in several parts. Three of these parts are located in the Smithy Forge. The base of the steam engine (5481) was located centrally in the Smithy Forge (BS158; 5.101, 5.102). It was a wrought iron horizontal engine, with a single cylinder painted in green and red livery. The following elements survive: the cylinder, cylinder shaft, governor, base marked 'A Lord & Co, Rochdale', slide bars. The associated Large Flywheel, eccentric, crank shaft, and crank disc (5418) were located to the north-west in the Smithy Forge as one element (BS159; 5.103, 5.104).



5.102: The Smithy Engine, stored in the Smithy, south-west facing, in 2013



5.101: The Smithy Engine, stored in the Smithy, north facing, in 2013

A large ferrous metal plate (5450; 5.105) for tying down plate designed to brace flywheel and drive shaft was located to the south-west. An oil bath of wood construction (5461, 5.106); a rectangular wood box designed to take oil to continually lubricate reduction gears (possibly associated with the steam engine and similar to that visible in the Pump House) contained junk and machine parts possibly from the engine.



5.103: The Smithy Engine Flywheel, in the Smithy, in 2013

A series of reduction gears of ferrous metal were possibly associated with the steam engine. Alternatively they had been salvaged from a former crushing machine. Two gears were housed in the Smithy Forge: a large metal reduction gear (5420) with 85 teeth, 6 arms, and a small ferrous metal reduction gear (5421) with four cut-away arms and 34 teeth (5.107). A further seven reduction gears were housed in Smithy Store 1 (5372, 5373, 5379, 5380, 5547, 5548, 5549; 5.108). These appear to be associated with a former crushing machine/ or alternatively another steam engine. They were probably recovered from the pumping station of the Sunbeam Works in Wincham.

onewayfrombarlick.co.uk/viewtopic.php?f=359&t=6738, date 12/06/2013



5.104: The Smithy Engine Flywheel, in the Smithy, in 2013



5.105: The Smithy Engine tying-down plate, in the Smithy, in 2013



5.106: The Smithy Engine oil bath, in the Smithy, in 2013



5.107: Reduction Gears in the Smithy Forge



5.108: Reduction Gears in the Smithy Store 1

Several parts appear to be missing from the Steam Engine. It is not clear where they are located. These include: The eccentric shaft, the piston shaft, the majority of oil drips, and any of the steam pipes.

Several items require further investigation and are housed in the Grosvenor Museum, Chester and appear to relate to this steam engine, although this cannot be confirmed without detailed examination.

Table 5.1: Machine Parts at the Grosvenor Museum Stores, Chester

Record Number	Description	Location
NOCMS : 2010.38.174	Machinery part painted red.	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.175	Metal part half painted red 'Small end cotter pin'.	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.176	Metal machinery part. Cylindrical hollow. Tipex labelled 'Front Rear.'	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.177	Machinery part. Metal glass fronted gauge. 0-100.	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.178	Metal pin/bolt and nut. 'Securing Pin for Connecting rod at crank pin end.'	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.179	Metal machinery part. Diagram located on label.	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.180	Metal machinery part. Cylindrical. Labelled 'Front Rear'	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.181	Metal machinery part. Securing Pin	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.182	Metal machinery part. Bolts with Nuts	Grosvenor Museum LSW Store Floor Box 14
NOCMS : 2010.38.310	Machine fitting. Brass. Various taps glass viewing chamber.	Grosvenor Museum LSW Store Bay 3 Shelf C

Phased Interpretation

Phase 5/6: The steam engine was originally located in shed east of Stove House 2. It was designed to power the crushing machine, now housed in Stove House 4, but originally housed in

Stove House 2. Openings in the side of Stove House 2 and its warehouse floor reveal where the belts passed into the warehouse level to the crushing machine. The crushing machine was moved by Henry L Thompson, in the late 1950s or 1960s. The steam engine was subsequently redundant for a number of years but still remained in a small attached covered hut, on the extant machine base, north of Pan 2 and to the west of Stove House 2.

Phase 7: In the 1970s the Steam Engine began a circuitous lifespan as it eventually moved to a series of sheds to the north of the Smithy. It was last seen in situ by Arthur P Bebbington in 1973 or 1974 when he undertook his survey of the surviving pumping mechanisms within the 'salt-fields' of Northwich, Winsford and Middlewich.¹³³

Subsequently it was dismantled, moved into storage before returning to the site. It was housed for a number of years as part of the working display of the 'Thompson's Museum' between the late 1970s and early 1980s. There it powered the line shafting, guillotine punch and bench saw located around the Smithy. This was a 'working display' of machinery.

Phase 8: The engine was dismantled in March 1990 by '8E Group', locomotive restorers. It has remained stored in the Smithy since this time. The cart shed it was stored in was dismantled at this time in order to make way for a new road in to the site south of the Red Lion Inn.

¹³³ Bebbington 1974, 10-11

5.5 THE LINE SHAFTING, GUILLOTINE PUNCH AND BENCH SAW

Historical Background

A series of buildings were constructed north and east of the Smithy that contained machinery used in the repair of the metalwork, including the pans at the Lion Salt Works. The earliest building was a cart shed that was not visible on the 1954 Ordnance Survey map (Matrix 2011, figure 11) but was present by the 1970 Ordnance Survey map (Matrix 2011, figure 12). The area between the cart shed and the Smithy was covered over with a shed by the 1970s or early 1980s to house the Abraham Lord steam engine (see above) and a large guillotine punch. A covered, lean-to, structure east of the Smithy dates to the 1990s, but replaced a similar earlier enclosed, lean-to, structure visible on photographs of the repairs dating to the 1990s. The set-up of these machines was not part of the original set-up of the Salt Works but instead was part of the 'working' museum display established in the early 1980s.

Description

The Line Shafting

The line shafting (6911; described previously above in the Smithy, BS121; 5.109, 5.110, 5.101), runs east west. It is supported on two north-south timbers between the northern gable end and Truss 2. These are also supported by two posts. The line-shafting exits the Smithy at eave level, and continues for a further 2.9m to the east. It is supported here by two posts (replaced in the 1990s). The line-shafting consists of a ferrous metal axle in two parts. A link is visible inside the Smithy. The axle turns on a series of three axle bearers, two either end and one in the middle. The power for the line shafting was provided by the Abraham Lord steam engine. This was initially transmitted to the line shafting by belts connected to the Flywheel and from there to two drive wheels mounted on the line shafting. These consisted of circular ferrous metal bands and spokes.



5.109: Line Shafting external to the Smithy, south facing



5.110: Line Shafting internal to the Smithy, west facing



5.111: Line shafting, wheels, south facing

At the eastern end, two ferrous metal drive wheels, with circular ferrous metal bands and spokes, transmitted power to the guillotine punch

and bench saw. A larger, narrower drive wheel (c. 1.2m in diameter) was designed to power the circular saw, allowing lower torque at higher revolutions per minute. A smaller, wider drive wheel (c. 0.40m diameter) was designed to power the guillotine punch, allowing higher torque at lower revolutions per minute.

The Guillotine Punch

The Guillotine Punch (6925, 5.112, 5.113, 5.114, 5.115) was a large ferrous metal machine designed for cutting, punching and shaping sheet metal. It was particularly used to form the ferrous metal sheets designed to repair the pans and cover the flues in the stove houses. It was orientated east-west, in parallel and north of the line shafting described above. Historic photographs reveal that it was originally aligned at an angle north-west to south-east. This suggests that an alternative power source was originally adopted.



5.112: Line Shafting connected to the Guillotine Punch by fabric belts

The Guillotine was second-hand and was derived from William Poole's Smithy, London Road, Northwich. It was used by Mr Houghton, in his youth and was of a type designed by Richard Roberts of Manchester. The original guillotine on

site was hand-driven as opposed to steam driven according to Henry Thompson.¹³⁴

It consisted of a large ferrous metal body with a central axle, c. 0.6m x 1.5m and 1.2m high. At one end was a large flywheel (1.35m, 53 inches in diameter). A single drive wheel (0.55m, 21½ inches in diameter), connected via belts to the line shafting (see above). Two reduction gears, a larger one (0.80m, 32 inches diameter, 6 arms, 60 teeth), reduced to a smaller gear (0.14m, 5½ inches diameter, 10 teeth). The axle connected to two separate tools: an upper opposing set of blades that acted as a guillotine and a lower punch, for producing holes (ie. for rivets). It was mounted on two large wooden sleepers.



5.113: The Guillotine Punch, east facing



5.114: The Guillotine Punch, north facing

¹³⁴ Mundling Stick, 2002, Vol 8/4, 3



5.115: The Guillotine Punch, drive wheels, reduction gears and flywheel, north facing



5.116: The layout of the Guillotine Punch, Bench Saw and Line Shafting, north facing

The Bench Saw

The cast iron ferrous metal bench saw (6926, 5.116, 5.117, 5.118) was located south of the line shafting. It was designed for cutting wood only. It consisted of a horizontal ferrous metal bench, 1.45m x 0.75m on a ferrous metal base with four legs. Set within the bench was a circular saw (0.56m, 22 inch diameter) driven by an axle connected to two drive wheels (0.20m, 8 inch diameter). The drive wheels connected to the line shafting (see above) and was aligned parallel to it.

Phased Interpretation

Phase 7: None of the machines appear to be original to the smithy. They appear to be part of a mechanisation period of the Salt Works

characteristic of Henry Thompson's final tenure. Elsewhere on site the use of electric motors is common. One photograph shows the guillotine at an angle to the line shafting. This strongly suggests that it was never powered by the line shafting. It would appear more likely that an electric or petrol driven solution was adopted. In Store 2 of the Smithy, a stand-mounted, Stuart Turner style, petrol-driven motor (5571) was found that appeared to belong to the 1970s period of the work. It is probable that this was used either to power the bench saw or the guillotine punch. The machines were realigned for display purposes in the early 1980s as part of the Thompson's working museum. It is probable that the line shafting dates to this period but without good photographic evidence for the earlier phases of the Smithy it is difficult to tell.

Phase 8: The Abraham Lord steam engine was dismantled in 1990 in order to make way for the new access road to the site and this saw the end of the working life of these machines.



5.117: The Bench Saw, north-east facing



5.118: The Bench Saw, saw detail

5.6 THE SALT VAN

Historical Background

The van was possibly built in Wakefield in c. 1900 by Charles Roberts and Co. The remains of painted lettering on the side of the van show that it was originally part of a fleet owned by Chance and Hunt Ltd of Oldbury, Wednesbury and Stafford. The company was absorbed by Brunner Mond and Co Ltd in 1917 before being taken over by ICI Ltd in 1927. The remains of ICI lettering are still visible overwriting the original lettering. Previous surveys (1991) have noted that it is possible to see the words [repairs advise] and [Winsford].

At the end of its working life it remained at ICI sidings in Northwich until 1977. It then passed into the hands of the Conway and Llanrwst Railway Society, North Wales. In 1987 members of the Foxfield Light Railway helped transfer the van from Dyserth Quarry to Blaenau-Ffestiniog, where it formed part of a private collection belonging to Mr R Morris. The wagon was brought to the Lion Salt Works in September 1991 and has remained on the private railway sidings since (see 5.119).



5.119: The Salt Van when delivered in September 1991

The works also relied on the rail network in parallel with the canal. Salt was transported from the Alliance Works to the main rail network via a rail line that ran to the Marston Hall Mine (north-west of the Lion Salt Works), The Adelaide (Mine and Open-Pan) Works (north of the Trent and Mersey Canal) and The Alliance Works which developed a series of sidings that ran into the centre of the works. From here the railway joined sidings in Northwich on the main Chester –

Manchester line. After the Alliance Works closed in c. 1900, new sidings were put in place that served the Lion Salt Works. They ran around the southern boundary of the site and finished in front of Pan House 3 and 4. The sidings were not designed for salt wagons that were brought up to the works from the railway that served the Marston Mine. The wagons used to wait in a sidings at the bottom end of Cross Street (the house today is called The Sidings). A single windlass is still visible in the Pump House (see above). This drew the wagons up the gradual incline from the end of Cross Street. A series of pulleys and couplings are likely to have allowed the carriages to negotiate the twisting route of the siding.

Description

The following description is based on original recording undertaken in 1992 by Andrew Fielding, Vale Royal Borough and updated by Chris Hewitson, Cheshire West and Chester. The Salt Van consists of a ferrous metal under carriage, with wooden sides and a pitched roof, with felt on top (BS160; 5.120, 5.121, 5.122, 5.123, 5.124).



5.120: The Salt Van, south-east facing, in 2013

External Diagonal Strapping and Corner Angles - The diagonal iron straps turn at the bottom to run along the side of the floor strips. The upper end of the straps, which terminate at the 6th plank, indicate that the original corner angles were narrower and thicker (7 inch x 7 inch x 3/8 inch; 178mm x 178mm x 9.5mm), than those now fitted (8 1/4 inch x 8 1/4 inch x 1/8 inch; 210mm x 210mm x 3mm). Battens which should have covered bolt heads inside the van are missing. The metal corner angles terminate at the 6th plank, with a separate corner bracket fitted horizontally around the 7th plank.



5.121: The Salt Van, east facing



5.122: The Salt Van, detail of surviving door

End Braces - There is a short vertical timber on both ends of the van, 7¼ inch x 2½ inch (184mm x 63.5mm) fitted below the apex of the roof. A pair of vertical timber braces passes from the roof to the buffer bar at 3 feet 4 inch (1016mm) centres, slightly wider apart than shown on Tracing No K38.

The 7th plank, and end planks to the apex of the pitched roof may have been fitted or altered during the working life of the van. It is possible that the pitched roof may have been added to an open wagon. Faint chalk marks on a roof purlin show the date 24/12/48 which may indicate when the work was carried out. Though the base frame has the same dimensions as Tracing No K38¹³⁵ this

¹³⁵ Tracing No. K38, contained within the Lion Salt Works collection, relates to a blueprint for a similar design of Salt Wagon, by Charles Robert & Co, but does not appear to be identical

particular van is over 1 foot (305mm) shorter in height compared to that particular specification.

Side Sheeting and End Planking - The side sheets have a 6 inch x 2 inch (152 x 51mm) cross-section. The side and end planking indicates that a new roof had been added to the van. The condition of the internal surfaces is quite distinctive between the two construction phases. This is caused by a general lack of paint over the internal surfaces and a general lack of weathering on the protected internal timber. There is a slight variation in plank width between the sides and ends of the van.



5.123: The Salt Van, south facing



5.124: The Salt Van, west facing

Side Doors - The door openings are 4 feet (1219mm) wide. The hinges are fitted to vertical straps which brace the side planking, rather than being hung on their own separate straps. One door has been extensively replaced using modern timber and screws. The three original iron hooks and rings for fastening the doors survive.

Wheels and Axles - The wheels (5.125) have centres at 8 feet 7 inches (2616mm), rather than the 9 feet (2743mm) indicated on Tracing No. K38. The journals are 8 feet (2438mm) long and 3¼ inch (95mm) diameter. Each of the four oil axle boxes are different, two were supplied by Charles Robert & Co. A third box was supplied by Wagon Repair Ltd and the fourth by ICI wagon repair workshop.



5.125: The Salt Van, the wheels and axles

The 'W' frames which hold and guide the axle boxes are of different design on each side of the wagon. The centres on one side are at 3 feet (914mm), as shown on Tracing No K38. The other side has tracing at 2 feet 6 inch (762mm) centres. The effect of the different frame widths is to position the brake level guides inside the two frames on one side, and outside the frames on the other side. The pins securing the axle springs in position have been removed in the past and are now lost.

Buffers and Brakes - One pair of buffers (5.126) is original. Looking at the other set of buffers indicates that the whole buffer bar has been replaced and that the buffer housings themselves have been replaced with a pair of smaller diameter. The coupling hooks, bar and buffer springs are all original. Brakes are fitted to both sides of the wagon. One inner strap support for the brake rods still survives, though the other has corroded away.

Interior Floor - The interior floor (5.127) consists of a series of 23 or 24 cross planks loosely attached. These have a 6 ½ x 2" cross-section and are 82" long. They have been patched with plywood in places.



5.126: The Salt Van, buffers



5.127: The Salt Van, Interior



5.128: The Salt Van, roof structure

Pitched Roof - The roof structure (5.128) consists of two trusses of plain principals, 4 inch x 2½ inch (102 x 63.5mm) cross-section. A ridge-beam, 6 inch x 3 inch (152 x 76mm) cross-section and two purlins, 4 inch x 2 (102 x 51mm) inch cross-section, support the roof. The roof is double skinned with over-lapping tongue and groove, 5½ inch x ¾ inch (140 x 19mm) cross-section.

Phased Interpretation

Phase 5-7: The van dates to c. 1900-1910, and was originally used in the midlands for Chance and Hunt Ltd of Oldbury, Stourbridge and Wolverhampton. It is likely that it came into the

possession of ICI Ltd via Brunner Mond Ltd. Subsequently it had a close association with ICI Limited and final location at Lostock Gralam sidings. The evidence suggests it was either an open roofed wagon for the first c. 40 years or had the roof repaired or replaced in the 1940s. Chance and Hunt were not salt producers and this may suggest that originally it was designed for the chemical industry, but that would not preclude the addition of a roof. Brunner Mond and ICI Ltd had a broad range of interests including salt and chemicals and it is likely that it was used as a salt van at this time. The salt van is not an original feature of the Lion Salt Works and has no direct association with the works. It does not form part of the Scheduled Monument or the listed buildings. However, this should not discount from its significance and importance for both the history of the salt industry and the railway industry. It is one of only 5 surviving salt wagons in the country (a figure of two is suggested in the Conservation Management plan possibly based on reference to two historic publications.¹³⁶

The best preserved example is displayed at the Scottish Railway Preservation Society museum at Bo'ness, on the southern shore of the Firth of Forth, sixteen miles west of Edinburgh (5.129).¹³⁷ It is actually two wagons made into one, a steel under frame built by Hurst Nelson of Motherwell part of tank wagon No. 7 for William Baird and Co Ltd of Glasgow. The body was recovered from a farm near Hawick where it served as a hay store for sheep. Another well preserved example is currently stored at Foxfield Wood sidings, Foxfield Railway, Caverswall Road, Blythe Bridge, Staffordshire (5.130).¹³⁸ Its length of only 16 feet suggests that it conformed originally to an earlier specification such as the RCH 1907 coal wagon design. The existence of brakes on only one side suggests it may have been withdrawn from main line service prior to WW2. On conversion to a plate layers tool van it was given a steep pitched roof, reminiscent of a salt van. It has original style split-spoke wheels but later pattern oil axle-boxes. SIS 3

was originally donated from Shelton to the Chatterley Whitfield Mining Museum and was bought privately at the auction in April 1994 after its closure. In generally better condition than SIS 2 when it arrived, it still carries its light blue livery.



5.129: Salt Van located at the Scottish Railway Preservation Society museum at Bo'ness



5.130: Salt Van located at Foxfield Wood sidings, Foxfield Railway, Caverswall Road, Blythe Bridge, Staffordshire

Three further bodies are listed on the Vintage Carriages Trust website,¹³⁹ two at a farm in Penicuik, Midlothian and a further ex-Saxa Salt Van owned by the Waverley Route Heritage Association at the Whitrope Heritage Centre in Hawick, Southern Scotland.¹⁴⁰

Phase 8: The salt van was moved to the Lion Salt Works in September 1991 and has sat on the railway sidings for the past 20 years.

¹³⁶ See Matthews, P, 1973, 119; Hudson, B, 1978, plate 72;

¹³⁷ www.srps.museum.org.uk/10100htm accessed 29/07/2013

¹³⁸ www.foxfieldrailway.co.uk/;

homepage.ntlworld.com/foxfield/shelton_vans.htm accessed 29/07/2013

¹³⁹ www.vintagecarriagestrust.org/surveystatus.asp accessed 29/07/2013

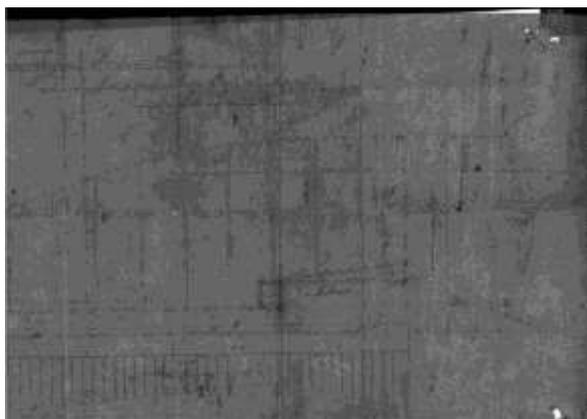
¹⁴⁰ wrha.org.uk/ accessed 29/07/2013

6. OTHER BUILDINGS

6.1 CORONATION SALT STORE

Historical Background

The Coronation Salt Store is believed to have been built to replace a warehouse the Thompson's had built at the Anderton Basin that collapsed in 1898 after which the Trustees of the Weaver Navigation tried to sue John Thompson for damages. The case collapsed on the death of John Thompson in 1899.



6.1: Plan of the Coronation Salt Store depicting the barrel roof by Henry Ingram Thompson (Weaver Hall Museum collection)



6.2: Coronation Salt Store depicted in c. 1919 with barrel vaulted roof

The new store was probably built in 1902 and hence it became known as the 'Coronation Warehouse'. A plan submitted by Henry Ingram Thompson shows that the store originally may have had a barrel roof that was later changed to a pitched roof (6.1). This is also depicted on early photographs (6.2).

The following represents a summary map and aerial photographic regression designed to supplement the historical evidence presented for the Coronation Salt Store within the Conservation Management Plan ¹⁴¹ and the Desk-Based Assessment. ¹⁴²

1882 - 1st Edition Ordnance Survey Map (6" to mile): The site is depicted as open ground to the west of Ollershaw Lane, although the site of the Red Lion Inn is well developed to the east. A single structure is depicted in the north-east corner of the site adjacent to the Trent and Mersey Canal and the bridge.

1898 – 2nd Edition Ordnance Survey Map (6" to mile): The site is depicted with standing buildings for the first time. A staggered building or two buildings appears on the map that closely correlates to the footprint of the current Coronation Salt Store. The eastern, southern and northern elevations appear to match the current footprint. The western elevation does not have its distinctive curved shape on the depiction on the map. ¹⁴³

1910 – 3rd Edition Ordnance Survey Map (6" to mile): The site is once again depicted as open ground with no buildings present. It is unclear if this is due to a mapping error by the Ordnance Survey or a deliberate omission. Significantly other buildings in the area that had been removed since the 2nd edition are absent suggesting that there was no building on the site at this time. ¹⁴⁴

1938 – 4th Edition Ordnance Survey Map (25" to mile): The Coronation Salt Store is once again depicted on the site. The scale of this map is much larger and the accuracy is therefore poor. It is likely that the Salt Store in its current form had been built on the site by this time. ¹⁴⁵

1940s – Aerial Photograph: The Coronation Salt Store is depicted on the site in detail for the first time. The black and white aerial photograph reveals the outline of the Coronation Salt Store as

¹⁴¹ Donald Insall 2005

¹⁴² Matrix 2011

¹⁴³ Volume I, 5.5

¹⁴⁴ Volume II, 3.51

¹⁴⁵ Volume II, 3.51

it currently stands with the distinctive curved western wall. The roof appears to be barrel vaulted.¹⁴⁶

1973 – Aerial Photograph: The Coronation Salt Store again appears on a 1973 aerial photograph. Although this photograph is over-exposed this does allow the pitched roof to be clearly visible.

1993 – Aerial Photograph: The Coronation Salt Store is unchanged and clearly visible on recent aerial photographs from 1985, 1993 (illustrated), 2000 and 2006.

Summary Description

The Coronation Salt Store was built to fill the available plot (6.3, 6.4, 6.5, 6.6; BS161, BS162, BS163, BS164, BS165). It thus has a curved western elevation, to fit the compact space (6.4). The eastern side is built around an access path to the tow path (6.5). The walls are horizontal boards nailed to the inside of vertical stud wall. At the corners the planks are lapped. The trusses are of lightweight scantlings set at wide distances (6.7, 6.8). The roof and sides were covered with sheets of corrugated asbestos.



6.4: Coronation Salt Store, east facing



6.5: Coronation Salt Store, south facing



6.3: Coronation Salt Store, south west facing



6.6: Coronation Salt Store, north facing

¹⁴⁶ Matrix 2011, fig. 11

Original access was via a double doorway opened on the north side to the towpath and the canal (6.4). Access was also provided from the southern side (6.6). A second wide door in the centre of the eastern wall allowed salt to be tipped into the store using carts that carried salt from the works on the opposite side of Ollershaw Lane.

The floor is boarded with large planks that rest on a framework of beams set into ash and clinker to aid drainage (6.7, 6.8). A central drain runs below the planks carrying foul water to a drain, and beyond into Ollershaw Lane.



6.7: Coronation Salt Store, interior, north facing



6.8: Coronation Salt Store, interior, south facing

Phased Interpretation

The earliest remains on the site date to the late 19th century and suggest that a previous warehouse formerly stood on the site constructed between 1882 and 1898. This was of staggered plan and it is clear that the plan on the eastern side of the current building fossilises this former plan. It is unclear at the current time if elements of the former plan survive within the fabric.

The date of the Coronation Salt Store has been suggested to be from 1901 (hence the moniker of

the Coronation Salt Store). However, the 1910 Ordnance Survey map does not show any buildings on the site. This may be a mapping error or suggest that no building existed. The plan for the current design of the salt store is depicted on a document by Henry Ingram Thompson suggesting this date is possible. It was certainly in place by c. 1919 when the building is shown in the background of a photograph.

The building originally had a barrel vaulted roof. This may have survived until after the 1940s as the aerial photograph suggests that the roof was barrel vaulted. This was subsequently replaced with a pitched roof by 1973.

6.2 DISMANTLED BUILDINGS: THE WALLER'S HUT

Historical Background

The Wallers' Hut was a former building that stood just south of the Manager's House. It was a simple timber-framed structure designed to accommodate the Wallers. The Wallers were a class of salt-makers who worked on the common and fishery pans. Unlike the fine pans these did not have roofs to protect them from the elements. Therefore, these salt workers were provided with their own hut in which to keep warm, eat their breakfast and lunch and dry their clothes.

The first Wallers' Hut on site was located just west of Stove House 3 (prior to the construction of Stove House 4). It is depicted on the 'Stock List' plan, which dates to the early part of the 20th century (c. 1900-1910), clearly marked 'hut'.¹⁴⁷ It continues to be visible on plans until the c. 1947 Aerial Photograph.¹⁴⁸

The building south of the Manager's House was first depicted on the c. 1947 Aerial Photograph, but could be much earlier as it is not depicted on any Ordnance Survey maps until 1970. It is difficult to conclusively claim this is a Waller's Hut and it may have acted as a small store.

The building was demolished in the early 1990s in order to make space for a temporary classroom/visitor's centre for the Lion Salt Works.

Description

The building was a small pitched roof shed. It was two-room plan, aligned north-south. Internally it was timber-framed, with mortice and tenon stud construction throughout. The exterior was clad with vertical boarding. The roof was clad with boarding and felted over the top of this (6.9, 6.10).

In the western elevation was a single wooden casement window to the northern room. A similar window originally gave light to the southern room from the south. It was replaced by a simple ledge and baton door.



6.9: Waller's Hut, early 1990s, north east facing



6.10: Waller's Hut, early 1990s, north west facing

Phased Interpretation

Phase 6: The presence of windows in the exterior suggests it was more than a simple shed. This would suggest it was a Waller's Hut designed to accommodate the overflow from the main Waller's Hut inside the works. Alternatively it may have acted as accommodation for the other salt workers within the works.

The hut was built by the 1940s as it was depicted on an aerial photograph. The original Waller's Hut was removed in the 1940s and it is arguable that this is the same structure and was simply moved when the area of the butter pans and fishery pans was redeveloped in the 1940s.

Phase 8: The structure was demolished in the early 1990s.

¹⁴⁷ Volume II, 3.52

¹⁴⁸ Matrix 2011, fig. 11

6.3 DISMANTLED BUILDINGS: THE CART SHED AND LEAN-TO BUILDINGS

Historical Background

A series of buildings were located to the south-east of the Red Lion Inn and north of the Smithy. These were a number of wooden structures that included a cart shed and storage sheds.

The first building was visible on the 3rd Edition Ordnance Survey Map of 1910.¹⁴⁹ It was a small rectangular structure. By 1947, this building had been demolished or replaced by a larger structure capable of accommodating a cart.¹⁵⁰ This was again visible on the 1970 Ordnance Survey Map.¹⁵¹

In the early 1990s a new entrance was built to the Lion Salt Works to the south of the Red Lion Inn, through the plot formerly occupied by two demolished cottages. As part of the planning permission for the entrance the sheds were demolished.¹⁵²

Description

The cart shed was a small open fronted, timber-framed and vertical planked shed, with an internal brick floor (6.11; BS166). The original structure had only one side wall unaltered. The walls were of vertical studs with cross-rails, all mortice-and-tenon jointed. The roof was pitched with a series of three purlins set on the principal rafters. The vertical planking had been white-washed on the interior. It was enclosed by additional buildings, cladding and cement asbestos sheeting. The covered spaces were open to the rear (the original rear wall had been removed).

To the east was a later lean-to addition that formed a basic garage.

To the south was a later lean-to roof that formed a covered space over the Abraham Lord (Smithy) Engine (see above, 6.12; BS166). The lean-to cover over the engine rested on the roof of the original shed and had broken the purlins of the cart shed.



6.11: Remains of the cart shed, early 1990s, west facing



6.12: Remains of the lean-to containing the Abraham Lord steam engine, early 1990s, west facing

Phased Interpretation

Phase 6: The cart shed was built prior to c. 1947. It was originally a single free-standing building. Given that the Red Lion Inn that lay adjacent had stabling facilities on the ground floor, it is not inconceivable that the shed was originally used to house a trap or wagon.

Phase 7: The building became further enclosed during the 1950s and 1960s. It became a general storage shed. The addition of a lean-to garage occurred in the late-1960s or 1970s, presumably to house the Thompson's Hunter Estate car. In 1980 the Abraham Lord Engine was brought back to site (it had been removed to storage). It was reassembled and a lean-to structure built over it.

Phase 8: All structures were demolished in 1990 to create a new access road.

¹⁴⁹ Volume II, 3.51

¹⁵⁰ Matrix 2011, fig. 11

¹⁵¹ Ordnance Survey Map, 1970, 1:25,000

¹⁵² Vale Royal Borough Council, planning application No. 4/21809, received 16/02/1990