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CHESHIRE WEST AND CHESTER

THE ALLIANCE AND LION SALT WORKS, MARSTON, NORTHWICH

Volume I: An Overview of the Historic Salt Industry | Chris Hewitson

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THE ALLIANCE AND LION SALT WORKS, MARSTON, NORTHWICH

SCHEDULED MONUMENT NO 34985

THE FINAL REPORT:

VOLUME I: AN OVERVIEW OF THE HISTORIC SALT INDUSTRY

REPORT NO 2015-01

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Contents

SUMMARY

Volume I of the final report brings together a wide spectrum of background material to place the site within its, geographical, geological, historical and archaeological setting. This includes Geology, History, Process, Trade, Transport and the Social background of the site. Archaeological sites can often be seen as isolated monuments devoid of context. The volume aims to bring together the necessary background information to understand the true significance of the monument.

This includes the geology of the Cheshire Salt Fields; the international and national context of the Cheshire Salt Industry; the history of the Cheshire Salt Industry; the history of the Marston and Wincham Salt Districts; The history of the Thompson Family and their business; the salt workers of the local area; the trade network of the salt works; details of how the site was run, including people, process and social background; and the transport industry that supported the salt works.

1. INTRODUCTION

Volume I of the report outlines the results of background research into the salt industry and places the archaeological remains of the Alliance and Lion Salt Works in their context. It is the culmination of archaeological work undertaken between 2009 and 2015 as part of the restoration of the Lion Salt Works.

It has been prepared in accordance with the mitigation strategy, the Project Design and the conditions of Scheduled Monument Consent. [1]

The development scheme from henceforth known as the site covers an area that includes the whole of the scheduled monument with the exception of the Coronation Salt Store and an area outside of the monument. Approximately two thirds forms part of Scheduled Monument (Scheduled Monument No 34985). The remainder of the site lies outside the area of the monument but is to be considered to form part of the contiguous monument. As the majority of the site lies within a Scheduled Monument the site as a whole should be considered nationally significant.

Site Description

The site (NGR 367109 375470) lies within the village of Marston; 2km to the northeast of Northwich in Cheshire. The works occupies a level site at a height of approximately 25m above Ordnance Datum (AOD), from where ground level falls gently in a south-westerly direction, towards the valley of the River Weaver (1.1).

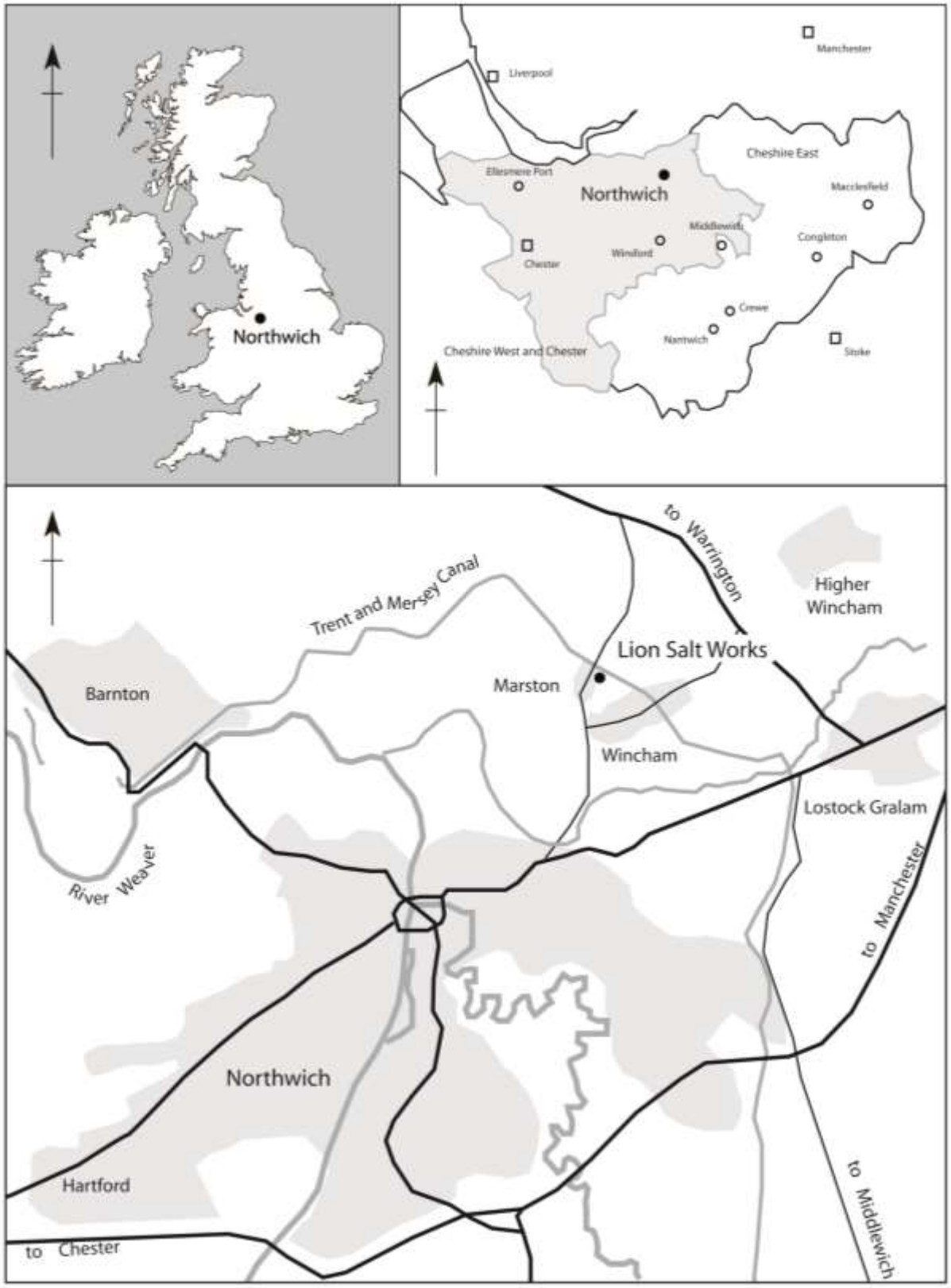
The site itself is bounded to the south by properties and houses within the village, to the west by the B5075 road (Ollershaw Lane) through the village, to the north by the Trent and Mersey canal and to the east by waste land. The Scheduled Monument comprises the main buildings of the complex and the land plot that surrounds them (see 1.2). The Scheduled Monument itself extends to the west of the main road in the form of a single warehouse the Coronation Salt Store. The actual site proposal includes land to the south of the scheduled monument as well as areas between the scheduled monument and the roadway.

The underlying geology is Mercia Mudstone Group, and the brine is extracted from the Northwich Halite Formation (formerly known as the Lower Keuper Saliferous Beds). The full geology of the area is described in greater detail in Volume II.

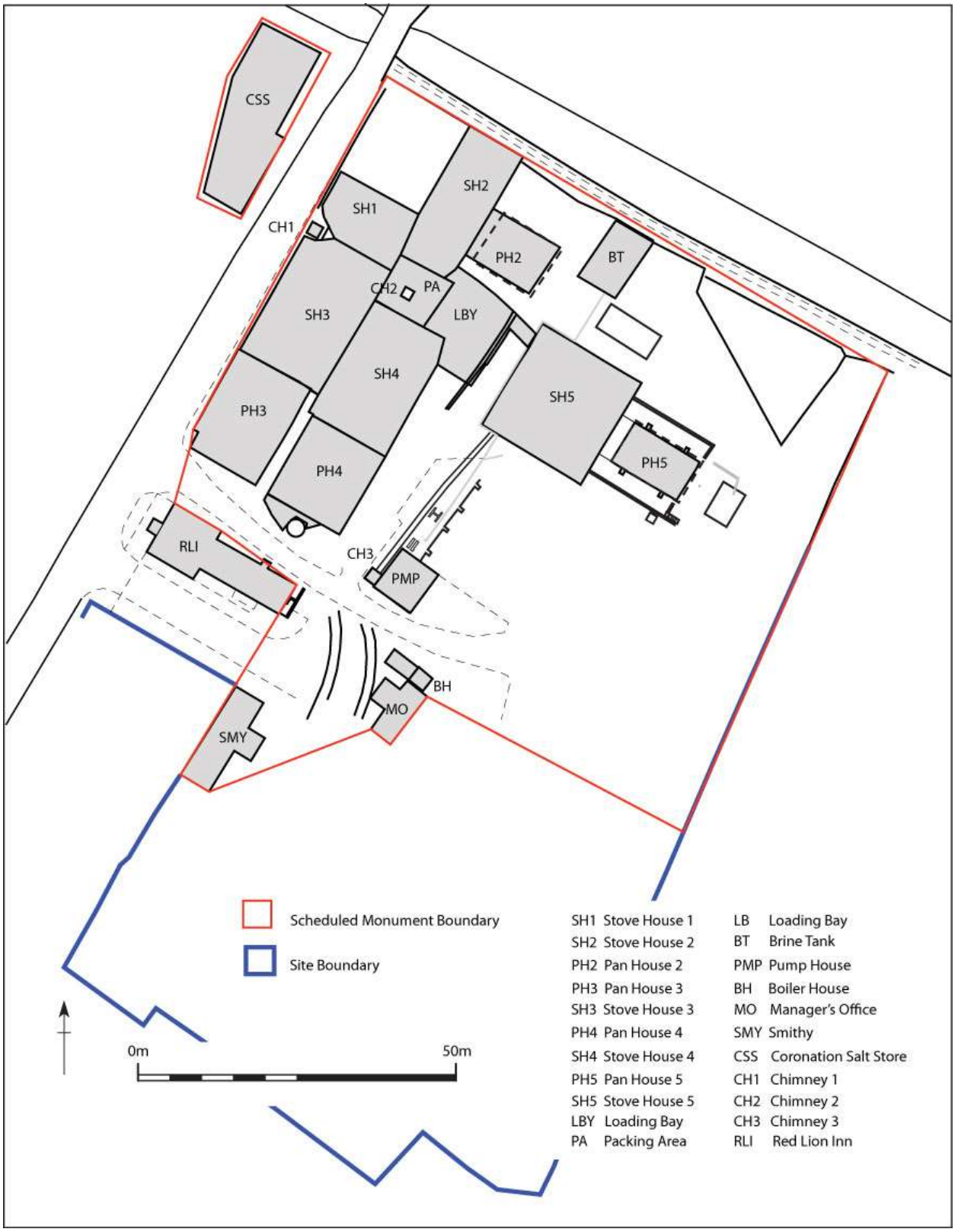
Twenty-three separate standing structures are discussed in these volumes. These are (numbers refer to Scheduled Monument Number and Listed Building Number on the English Heritage Register):

1. Stove House 1 (The Link Block, SH1) SM 34985; LB 1329875
2. Pan House 2 (PH2) SM 34985
3. Stove House 2 (SH2) SM 34985; LB 1329875
4. Pan House 3 (PH3) SM 34985; LB 1329875
5. Stove House 3 (SH3) SM 34985; LB 1329875
6. Pan House 4 (PH4) SM 34985; LB 1329875
7. Stove House 4 (SH4) SM 34985; LB 1329875
8. Chimney 1, (CH1) SM 34985; LB 1329875
9. Chimney 2, (CH2) SM 34985; LB 1329875
10. Packing Area (PCK) SM 34985; LB 1329875
11. Loading Bay (LBY) SM 34985; LB 1329875
12. Link Bridge (LNK) SM 34985
13. Stove House 5 (SH5) SM 34985
14. Pan House 5 (PH5) SM 34985
15. Engine House and Brine Tank, (BTK) SM 34985
16. Nodding Donkey Complex (NDK) SM 34985; LB 1160985
17. Over-ground Flue, (OGF) SM 34985; LB 1160985
18. Chimney 3, (CH3) SM 34985; LB 1160985
19. The Pump House, (PMP) SM 34985; LB 1160985
20. Boiler House (BOIL) SM 34985; LB 1160985
21. Manager's House (MHO), SM 34985; LB 1139103
22. The Smithy (SMY) SM 34985
23. Red Lion Inn (RLI)

[1] Matrix 2011; CWAC 2012-005; English Heritage 2012



1.1: Site Location - The Lion Salt Works is located within the small village of Marston, 2km to the north-east of Northwich in Cheshire.



1.2: The Site – The site is bounded to the south by properties and houses within the village, to the west by the B5075 road (Ollershaw Lane) through the village, to the north by the Trent and Mersey canal and to the east by a new caravan park.

The majority, but not all of these buildings were covered during their original Grade II listing on the 19th August 1986. [2] The remains of Pan House 2 and the Engine House and Brine Tank, were not included in the original listing as they were not regarded as buildings. The buildings with the exception of the Red Lion Inn were scheduled on the 24th April 2002. [3] They were designated the Scheduled Monument Number 34895.

In addition to these buildings the Coronation Salt Store lies on the western side of Ollershaw Lane. This forms part of the complex but has not been reported on in the current work. It forms part of the Scheduled Monument and is Grade II Listed (SM 34985; LB 1329876). [4]

The entire below-ground archaeological remains of the Lion Salt Works, with the exception of some of the railway sidings, are within the Scheduled Monument boundary. The Scheduled Monument partially includes the remains of the Alliance Salt Works, a precursor of the Lion Salt Works. The boundary of the Scheduled Monument was artificially defined by the original land plot of the museum, and does not include buried remains of the Alliance Works that lie to the south, within Cheshire West and Chester Council's land or buried remains to the east within private land holdings.

The original protection of the buildings was provided by the Marston (Lion Salt Works) Conservation Area designated in 1979. This was set up with the prime aim of preserving the site and setting of the Lion Salt Works. All of the buildings, the land plot of the Lion Salt Works and the Land Plot of the Alliance Salt Works were included in the Marston (Lion Salt Works) Conservation Area. In addition it encompassed the Crystal Cottage and mine to the east, the Adelaide flash and associated mine to the north-west and the outline of the Ollershaw Lane flash to the north. It was part of a draft proposal for revision in 2004 to include the remains of the Alliance Works outside the boundary of the Scheduled Monument, the remainder of the archaeological remains of the Alliance Works and Ollershaw Lane works and the remainder of the 19th century core of the village along Ollershaw Lane and Cross Street. [5]

In addition they abut the Trent and Mersey Canal Conservation Area. This follows the line of the canal and includes significant structures and areas either side of the canal, of which the Lion Salt Works is one.

Archaeological and Historical Background

The background history of the site has been researched over the past 30-40 years and is covered in detail within Volume II of this report. In summary the first occupation of the site in the early modern period occurred in the late-18th or early 19th century when the Red Lion Hotel was constructed. In 1857 John Thompson Senior (1790-1867) and John Thompson Junior (1821-1899) constructed the Alliance Salt Works. In 1894, following disagreement with the Salt Union over the roles of Thompson family members, John Junior and his son, Henry Ingram Thompson, constructed a new salt works in the coal yard of the Red Lion Hotel, and the works became known as the 'Lion Salt Works'. The current Red Lion Inn was converted from two cottages on Ollershaw Lane in *c.* 1900. The Lion Salt Works continued in use until 1986 when it finally closed. It was then purchased by Vale Royal Borough Council (VRBC) in order to preserve it for future generations.

From 1993 until 2009 the site was managed by the Lion Salt Works Trust on a lease, who ran the site as a museum and began the process of restoration. They were successful in restoring the Red Lion Inn to a visitor's centre, the Manager's House and the Smithy. From 1992 to 1995 a series of archaeological excavations were conducted that revealed remains of the Alliance Salt Works. By 2006, they secured funds from the Heritage Lottery Fund to restore the site fully as a museum.

2 Digital archive: English Heritage. 2005. List of Buildings of Special Architectural or Historic Interest. 57604, 57605, 57606

3 Scheduling record: English Heritage. Various. Schedule Entry (Scheduled Ancient Monuments Description). MPP35/AA 101128/1

4 Digital archive: English Heritage. 2005. List of Buildings of Special Architectural or Historic Interest. 57607

5 Vale Royal Borough Council 2004 Marston (Lion Salt Works) Revised Conservation Area Appraisal, Consultation Draft

In 2009, the site was transferred to the newly formed Cheshire West and Chester Council (CWAC). The current project is funded by a combination of the Heritage Lottery Fund, Cheshire West and Chester Council and Manage +.

Phase 1a enabling works were conducted in July to October 2009. [6] The works were overseen by Donald Insall Associates, project managed by Turner and Townsend and the archaeological work was supervised by Andrew Fielding (VRBC). This involved the dismantling of Pan and Stove House 5 that had become structurally unstable. The materials from these buildings were to be reused in the construction of a new visitor's and conference centre, modelled on the original form and layout of Stove House 5 and within the historic core. In addition, Stove House 1, the Link Bridge, Loading Bay and Pan House 2 had partially collapsed and were also dismantled.

An archaeological evaluation was conducted in November 2011 by Oxford Archaeology North to further enable understanding of the buried archaeological remains. [7] Using the information from these reports a Mitigation Strategy was formulated that enabled the restoration work to commence whilst protecting the remains of the Scheduled Monument, and allowing their recording in advance of destruction, alteration or dismantling. A Project Design was produced by Cheshire West and Chester in response to this mitigation strategy that proposed a programme of archaeological work.

Further archaeological work was conducted in 2011 to inform mitigation measures for the potential constructional impact upon the surviving archaeological remains, upon the advice of Dr Jennie Stopford of English Heritage. This included desk-based assessment of the site. [8]

The enabling works were completed between February and July of 2012 and involved the propping of the surviving buildings to allow restoration. The development works commenced in October 2012 and lasted until March 2015. It included historic building recording of all the standing structures, excavation by Oxford Archaeology North (OAN) on the site of the dismantled Stove House 5; watching briefs on all rebuilding works and new foundations and watching brief on all external works including services and landscaping. [9]

Aims and Objectives

The aims and objectives of work on site were stated in the Updated Mitigation Strategy (Matrix 2012) produced for Scheduled Monument Consent and reiterated in the Written Scheme of Investigation for planning consent (CWAC 2012-002) and the Project Design (CWAC 2012-005) but have been briefly restated here for clarity.

The aims and objectives of work on site were stated in the Updated Mitigation Strategy (Matrix 2012). The stated project aims are:

- Aim 1: Understanding of remains of Red Lion Hotel
- Aim 2: Understanding of remains of mid to late 19th century Alliance Salt Works
- Aim 3: Understanding of remains of late 19th century Lion Salt Works
- Aim 4: Understanding of remains of mid-20th century Lion Salt Works
- Aim 5: Understanding of the salt industry.

The project objectives are:

- Objective 1: Site recording prior to destruction or alteration during Phase 2 works.
- Objective 2: Relating above-ground and below-ground remains to technical and process changes over time; and comparing these with historic, cartographic and oral historical evidence for features in Aims 1, 2, 3 and 4 above.

6 Original work was conducted under scheduled monument consent, issued under a letter dated the 11th August 2009

7 Evaluation was conducted under scheduled monument consent (Class 7), ref S00017920, letter dated 31st October 2011, English Heritage to Donald Insall Associates

8 Matrix Archaeology 2011

9 Full development was conducted under scheduled monument consent, letter dated 20th April 2012, variations approved 1st October 2012, 18th July 2013, 23rd August 2013, English Heritage to Donald Insall Associates. It also required planning permission, ref 11/02820/FUL, with specific archaeological conditions nos 15, 16 and 17, letter dated 6th July 2012, Cheshire West and Chester Council, Planning Service to Museums and Culture.

- Objective 3: Placing the site in the historical context of the salt industry in accordance with Aim 5. Adding to and elucidating technological, social and economic aspects of the industry as evidenced at the site. Identifying changes (or a lack of change) to these aspects over time.

Layout of the Final Report

The final report has been laid out in a series of volumes detailing the history, below-ground archaeology, historic building recording, finds recording and restoration undertaken during the project. This has drawn together the findings of previous reports in an integrated fashion. This overarching Final Report takes the following format:

	Description
Volume I: Introduction Geology, History, Process, Trade, Transport and Social background	A detailed background to the works; aims and objectives, a detailed description of the current work. A description of the context within which the works is based. Should include the geology, the salt industry, the open-pan salt process, transport links, trade, the Thompson family and Marston community.
Volume II: The Alliance and Lion Salt Works	A detailed description including specialist reports of all the finds recovered from the site between 1992 and 2014. The final volume should be an overarching discussion of the works, combining all sources of information into a single narrative.
Volume III: Appendix 1 - The Alliance and Lion Salt Works: The Archaeological Excavations	A detailed description and analysis of all the excavations conducted on site between 1992 and 2014.
Volume IV: Appendix 2 – The Lion Salt Works: The Standing Structure	Report on the standing buildings on site with detailed description and analysis of the standing buildings.
Volume V: Appendix 3 – The Finds, Bibliography and Glossary	All survey images as a single volume; All contextual records as a single volume; All finds data as a single volume

Table 1.1: Summary of the Final Report

Acknowledgements

The report has been produced by Chris Hewitson (Cheshire West and Chester).

Thanks are due to the members of the Cheshire West and Chester client team including Steve Woolfall, Katherine West, Richard Andrews, Karen Williams, Jason Doherty and Mike Dix (Cheshire West and Chester); The Design Team, including Simon Malam (Donald Insall Associates), Emma Birkett (Turner and Townsend), Nick Holt (ARUP), Bob Costello, and the Construction Team including Bernhard Talbot, Chris White, Jordan Gregory, David Mellor, Stephen Hindley (Wates Construction) and Jonathon Western (William Annelay).

Archaeological work has been undertaken by Andrew Fielding (Groundworks Trust, Lion Salt Works Trust, Vale Royal Borough), Chris Hewitson (Cheshire West and Chester), Ian Miller, Chris Wild, Graham Mottershead, Lewis Stitt (Oxford Archaeology North) and Mark Fletcher (Matrix Archaeology). Specialist finds input has been provided by Christine Hamilton-Davis (Oxford Archaeology North). The report was monitored by Mike Morris, Jill Collens (Cheshire West and Chester), Jennie Stopford and Andrew Davison (English Heritage).

Photographs have been produced by Chris Hewitson (CWAC), Andrew Fielding (Vale Royal Borough), various historic sources and English Heritage. The illustrations have been produced by Chris Hewitson and Cheryl Quinn (CWAC) and are based on surveys by Aedeas, Tower Surveys and Donald Insall Associates.

The report was produced as part of the restoration of the Scheduled Monument of the Alliance and Lion Salt Works. The work was funded by the Heritage Lottery Fund, Cheshire West and Chester Council and Manage +.

2. GEOLOGY

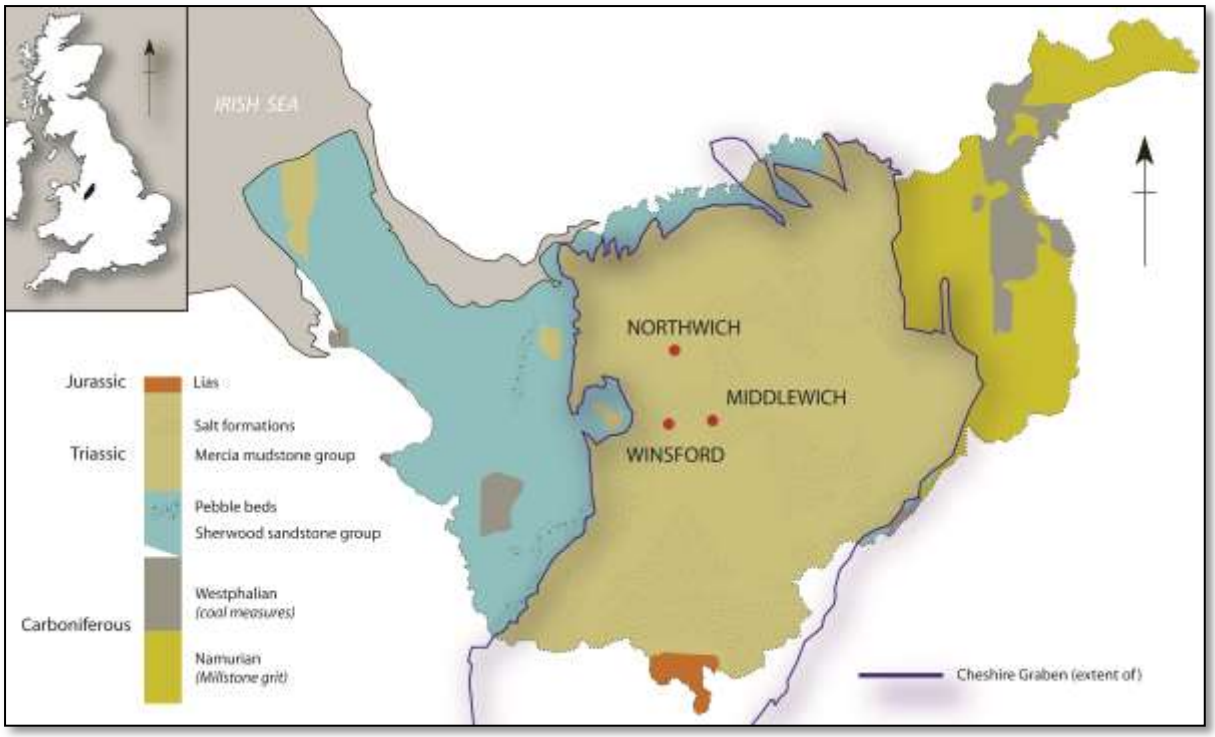
Salt production in Cheshire was a result of the county's underlying geology, which incorporated large salt deposits.

The solid geology of the region is formed of Triassic Mercia Mudstone formerly known as Keuper Marls. [10] This consists of a sequence of mudstones and halite deposits, about 1200m thick, deposited in a fault-bounded subsiding basin known as the Cheshire Graben. The Cheshire Graben extends between the hills of the Delamere Forest and the Staffordshire and Derbyshire border, in a basin comparable with an elongated saucer with its longest axis lying in a nearly north and south direction (2.1). [11]

Halite is a naturally occurring crystalline substance with a chemical composition (NaCl, Sodium Chloride) that varies little. It begins to precipitate when the quantity of seawater has been reduced to 10% of its original volume. Theories on the formation of the halite salt fields of Cheshire have evolved over the past 200 years. They were formed during the Triassic Period (about 220 Million Years BP). The Cheshire Graben, as described above, was a large, shallow, subsiding basin. This was separated from the sea by an elongated bar of land. This was subsequently filled by influxes of seawater. This caused salt deposits to be laid down under condition of high evaporation. [12] It has been calculated that a total evaporation of nearly 2,150m column of seawater at 25° Celsius would be required to produce the 24m thick salt beds. Therefore, in order to create the depth of salt beds it would appear that the basin was periodically inundated by seawater replenishing the concentrated brine. This led to several layers of deposits including glassy pure salt caused by the repeated evaporation of salt, impure salt mixed with sedimentary rock, and layers of soft sedimentary rock known as marlstone. [13] The area was then subject to a post-glacial period of uplifting and erosion. [14]

The best-known and most important beds of rock salt are concentrated about the centre of this basin, in the neighbourhoods of Northwich and Winsford, below present sea level, in the Triassic Mercia Mudstone. In the Northwich region the Mercia Mudstone formations overlying the Northwich Halite have been removed by erosion. The Northwich Halite is 55–60m thick and consists of two beds of rock salt known as the Top and Bottom Beds. These beds spread from Northwich town centre, in the Baron Quay's area, to the north-east of Marston in an area around two miles in diameter. The interface between the overlying strata and the rock-salt deposits, where brine from dissolution of the salt is present is known colloquially as the 'wet rockhead'. The top bed is from 25–27.5m (84–90 feet) in thickness at Marston and Wincham, divided from the lower bed by 9–10m (30–33 feet) of marl and marlstone (referred to as the 30 foot marl). Variations in thickness appear to be due to natural solution of the bed. The bottom bed is 25.6–27.8m (85–92 feet) in depth, and no wet rockhead appears to exist. For example, salt was located at Neumann's Mine, Marston, between 55.3 feet (16.7m) and 143.3 feet (43.2m) below Ordnance Datum in the upper bed and 172.34 feet (51.9m) and 257.3 feet (77.5m) in the lower bed. The bottom part of the lower bed was found uniformly to be the best quality. [15] Overlying the solid geology, the glacial drift geology from the last (Devensian) period consists of glacial till with minor fluvial-glacial deposits. Some fluvial-glacial and local glaciolacustrine deposits infill sub-glacial melt-water channels, particularly in the Baron's Quay area. [16]

10 British Geological Survey 2002.
11 Brooks *et al* 2006, 3.
12 Notholt and Highley 1973.
13 Morrison n. d. (b).
14 Drury and Iles 1992.
15 Calvert 1915, 145–150.
16 Brooks *et al*, 2006, 4.

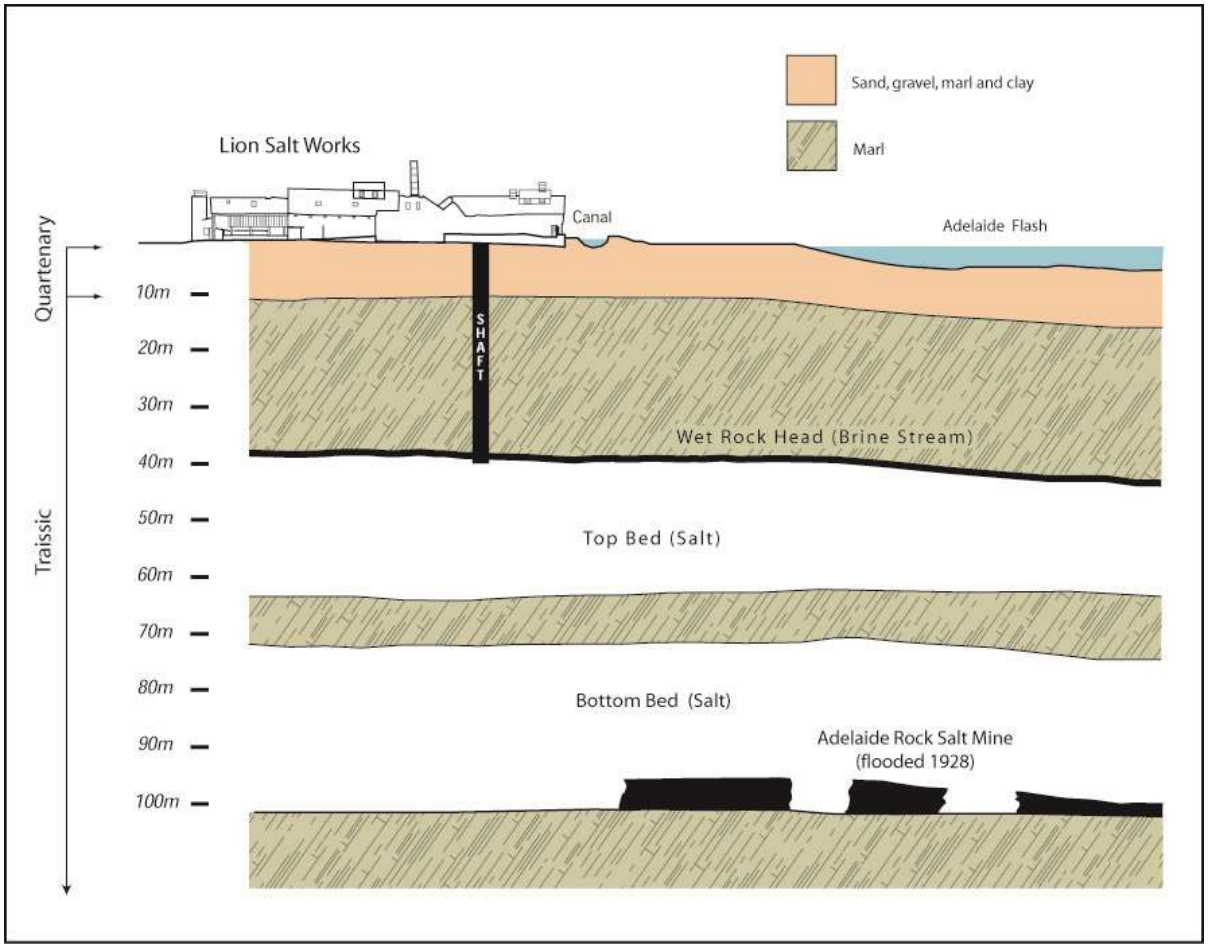


2.1: The Cheshire Graben and Geology of the Cheshire Salt Fields The solid geology of the region is formed of Triassic Mercia Mudstone formerly known as Keuper Marls. This consists of a sequence of mudstones and halite deposits, about 1200m thick, deposited in a fault-bounded subsiding basin known as the Cheshire Graben. The Cheshire Graben extends between the hills of the Delamere Forest and the Staffordshire and Derbyshire border, in a basin comparable with an elongated saucer with its longest axis lying in a nearly north and south direction.

The distinct feature of the hydrogeology of the area is formed at the surface of the top bed, the wet rockhead. This is impermeable and an underground aquifer flows across it (2.2). Where this aquifer comes close to the ground surface, the stream of brine appears up fault lines within the natural geology, in particular at locations on the side of the Weaver or Wheelock valleys. It emerges here as natural brine springs. The springs look like most other springs, but the water itself is saline. Within the region between Northwich and Middlewich the brine springs contain 25% to 26% of pure salt, the highest concentrations being within the springs at Anderton where the percentage is as high as 26.56%. [17] These became the first locations for salt making in the Prehistoric and Roman periods. Brine springs denote the locations of the Cheshire Salt towns of Northwich, Winsford, Middlewich and Nantwich.

In addition, man-made aquifers exist between the flooded mines beneath the surface. This will be discussed in more detail below.

17 Holland 1811, 214.



2.2: The salt beds around the Lion Salt Works spread from Northwich town centre, in the Baron Quay's area, to the north-east of Marston in an area around two miles in diameter. The interface between the overlying strata and the rock-salt deposits, where brine from dissolution of the salt is present is known colloquially as the 'wet rockhead'. The top bed is from 25–27.5m (84–90 feet) in thickness at Marston and Wincham, divided from the lower bed by 9–10m (30–33 feet) of marl and marlstone (referred to as the 30 foot marl). Variations in thickness appear to be due to natural solution of the bed. The bottom bed is 25.6–27.8m (85–92 feet) in depth, and no wet rockhead appears to exist. The bottom part of the lower bed was found uniformly to be the best quality.

3. THE INTERNATIONAL AND NATIONAL SALT INDUSTRY

Salt or Sodium Chloride (NaCl) is present in nature either in solid as rock salt (halite) or in solution as brine. Salt is used extensively in food processing for preservation and flavouring, for snow and ice clearance, as a fertiliser, and as an ingredient in the heavy organic chemical industry to produce chlorine, caustic soda and soda ash. Historically, the salt industry has been supremely important in food preservation, with a particular importance in the Baltic and North Sea where it has been used in preserving fish.

The International Context of the Cheshire Salt Industry

Salt making has been essential for several thousand years, from the time of the Ancient Egyptians and Chinese, the Greeks and Romans, the Mayans and all through the medieval period. The subject is too exhaustive to describe in a single paragraph [18] but the necessity for salt as a preservative and food enhancer meant production was ubiquitous both in terms of historical era and geographical area. Its value, far greater than today, has meant control of salt production and its taxation was vital as a means to enrich the political elite.

In Europe salt production was carried out in a variety of diverse locations. In warmer climates it relied on solar evaporation within 'salinas', open, shallow basins. This included coastal production along the Atlantic sea coast including the Bay of Biscay, and the Portuguese Coast e.g. Figuiera da Foz. [19] Inland production also adopted salinas at sites such as Imon and La Olmeda, Guadalajara [20] and Salinas de Añana, Alava, Spain. [21]

Open-pan salt production internationally, like in the United Kingdom, was confined to a few locations were geological conditions preserved layers of salt beneath the ground. Only three other complexes of open-pan salt works now survive: The Colorado Salt Works, USA, [22] Salins-les-Bains, France [23] and Saline Luisenhall, Göttingen, Germany. [24]

3.1: Colorado Salt Works, USA.

Of these, the Colorado Salt Works (3.1) is in a state of collapse, Salins-les-Bains has been restored and operates as a museum and only the latter, Saline Luisenhall (3.2), is still actively producing salt in 2013. The absence of surviving remains of open-pan salt works demonstrates the significance of the Lion Salt Works as a monument to this former industry.

3.2: Saline Luisenhall, Göttingen, Germany.

The National Context of the Cheshire Salt Industry

In 1996 the English Heritage Monument Protection Programme identified the Salt Industry as a significant industry worthy of further study. As one

18 An excellent readable history of salt production is Mark Kulansky 2002 *Salt: A World History*.
19 Hueso and Pinto 2005, 33–38.
20 Hueso 2005, 39–48.
21 Lander 2005, 49–68.

22 Powell 2005, 69–80.
23 Grassias 2005, 81–88.
24 Rossner 2013.

of a series of studies, the Monument Protection Programme 'Step 1' Report summarised the development and outlined the surviving features of the industry, identify the main source of detailed information. [25] This produced a gazetteer of sites together with a glossary of terms, a technical description of processes and a summary of the historic development of salt making. The report is divided into three parts to reflect the distinct nature of the technical processes involved in coastal salt production, inland salt production and salt refining.

The following represents a summary of this report to place the Cheshire Industry, and more specifically the Lion Salt Works and the Northwich Salt Industry within the wider context of salt production in Britain.

Historic Salt Production

Two types of salt are historically produced, known commonly as 'rock salt' and 'white salt'. Rock salt is mined underground in a conventional way.

White salt is made by the evaporation of brine. Brine is obtained in several ways.

- 'Wild brine' streams, occurring from the natural solution of rock salt by ground water, can come to the surface as natural brine springs or can be pumped up to the surface at well, shafts or boreholes.
- 'Artificial brine' is obtained through solution mining of rock salt with fresh water and is known as 'controlled brine pumping'.
- A 'Bastard Brine' used to be made by allowing fresh water to run through abandoned rock salt mines.
- A 'Salt-on-Salt' process strengthens brine by dissolving rock salt, and/ or, crystal salt in weak brine or sea water prior to evaporation.
- Solar Evaporation uses the sun to strengthen and evaporate sea water trapped on the sea-shore to make sea salt crystals, or to strengthen and evaporate brine sourced from natural springs where it is made into white salt crystals.

25 English Heritage 1992; Stocker, 1995.

Although brine, usually seawater, can produce salt by solar evaporation alone, the climate of the Britain is insufficiently warm to produce salt by this method. Instead artificial heat is applied in 'pans' and brine is boiled until salt is produced. This technique is known as the open-pan method. Two distinct regions of salt production can thus be defined by these processes: Coastal Salt Production and Inland Salt Production. A third type of salt production referred to as salt refining occurred in the 18th and 19th centuries.

Coastal Salt Production

Coastal salt production occurred throughout the prehistoric, Roman and medieval periods. There was little technological advance in salt production in the medieval and early post-medieval period. The process involved solar evaporation of seawater, followed by artificial evaporation of salt using the open-pan technique in structures known as 'salterns'. 'Saltern' is a termed used to describe a complex of features designed to extract salt from brine by evaporation. The term salt works is more applicable to the later 17th- to 20th-century industrial structures. The Domesday Book recorded 1195 *salinae*, a Latin term for saltern, where seawater was evaporated to make salt. These were located along the coast mostly in Sussex, Norfolk and Lincolnshire. By the later medieval and post medieval period salterns developed along the coast at locations such as Lincolnshire, the Solent, on the west coast of England at Cumbria and on the Firth of Forth. [26] However, the cost of salt produced in Britain was always higher than the 'Baye' salt produced by solar evaporation in France and Spain and considerable quantities of salt were imported. These patterns continued up until the 19th century, when the amount of sea salt declined, initially due to competition from continental sea salt from the Atlantic Coast, produced by solar evaporation. Towards the middle of the 19th century severe competition from inland sources resulted in the decline of the coastal industry. [27]

26 Barford *et al* 1998, 3–30; Cranstone 2006; Whatley 1987; Lewis *et al* 1999;
27 Barford *et al* 1998, 3–30.

Inland Salt Production

A geological map of England reveals the location of potential inland salt making sites that could utilise brine derived from rock salt strata (3.3).

Cheshire and Worcestershire provided the principal sources of inland salt production from the prehistoric period through to the 19th century. It was only with the end of the 19th century that the huge market share developed by the Cheshire Salt Industry was lost, declining from 86% in 1882 to 49% in 1913. Alternative sources of inland salt production were utilised at Stafford, Teeside, Fleetwood and Carrickfergus. [28]

Teeside: A 100 foot (30m) deep layer of salt was discovered as a depth of 1200 feet (366m) in 1862. It was utilised throughout the 19th century, reaching its peak in 1894. The industry was in decline by the 1920s, but a single salt works survived until 1970. [29]

Preesal, Lancashire: A 400 foot (122m) deep layer of salt was discovered 300 feet (91m) below the surface in 1872. It was developed initially by the Fleetwood Salt Company before being taken over by the United Alkali Company. The brine was pumped over the River Wyre to the Open Pan Saltworks and Ammonia Soda Works. Rock Mining was also undertaken from 1893 to the 1920s. [30]

Staffordshire: The rock salt bed around Stafford was a detached element of the Cheshire basin. Salt works developed in Shirleywich and Weston in the 18th century but supply declined throughout the 19th century. By 1893 a saltworks had been opened on Stafford Common with a further saltworks at Baswich supplied from the common. The Stafford Common works closed in the 1970s.

Worcestershire: Much like the Cheshire beds, rock salt is contained within the Triassic marls and sandstones and emerges in springs along the River Salwarpe around Droitwich. The exploitation of salt works at Droitwich had been undertaken throughout the prehistoric, Roman and medieval periods and has been the subject of a series of excavations. [31] The principal industry centred on the Netherwich, Middlewich and Upwich districts. De-regulation of the industry in 1695 led to its expansion into other areas of the town. This was further stimulated by the construction of the Droitwich Canal by James Brindley in 1768 that created a direct link to the River Severn. The Droitwich Industry reached its peak in 1872 when 120,000 tonnes of salt were produced. [32]

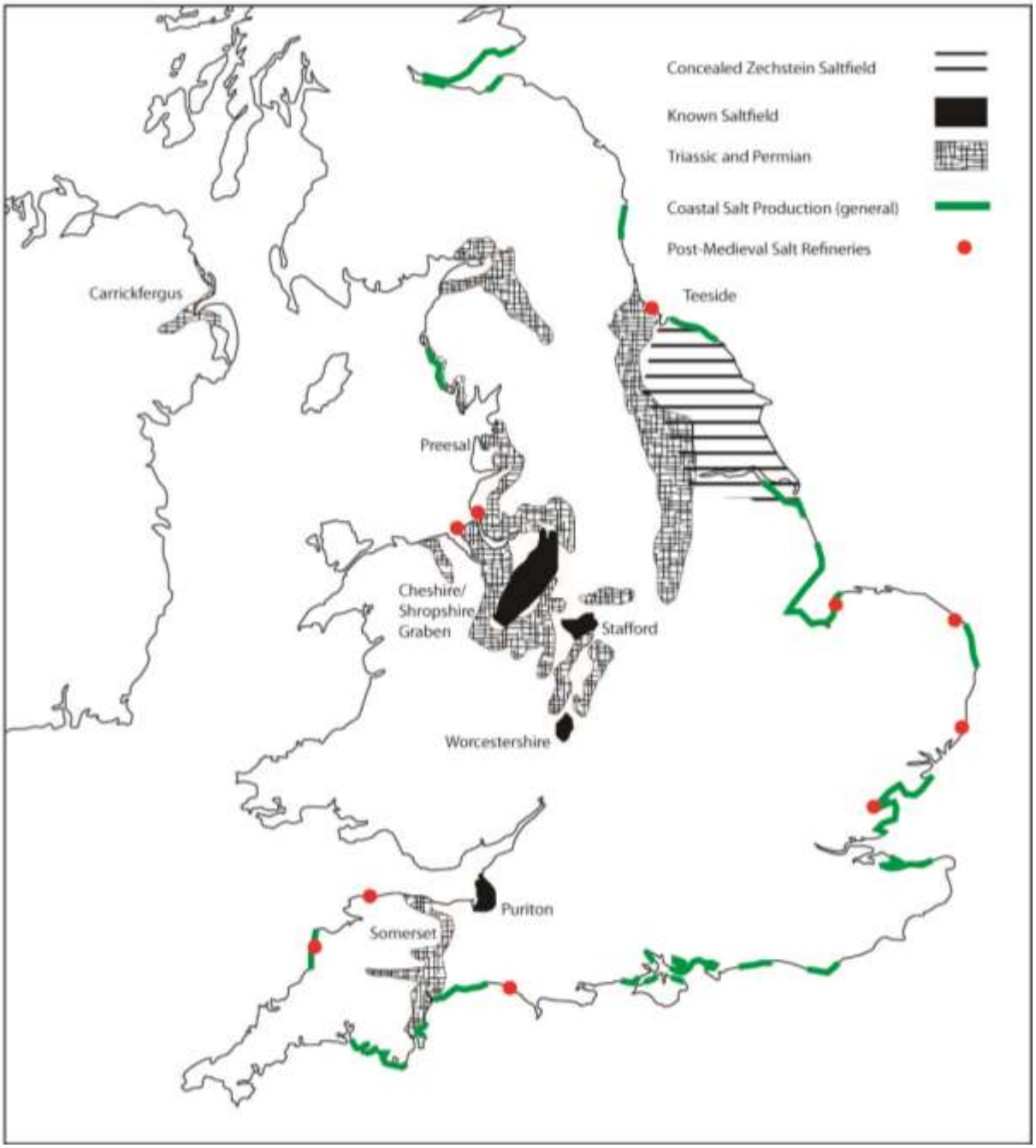
A new source of brine was discovered 3.5 miles to the north-east at Stoke Prior in 1825. By the late 19th century this had surpassed Droitwich, causing the cessation of production in the town in 1922. Production in Stoke Prior continued until 1973.

Cheshire: The Cheshire industry existed from prehistoric industry. It appears to have been exploited continuously using the open pan method from the Roman period until the 20th century, with the Lion Salt Works representing the final remnant of the industry. This is discussed in greater detail below.

Salt Refining

By the end of the 17th and the 18th century, a large-scale salt industry developed in coastal locations, based on a combination of inland salt mining and coastal salt production. Referred to as salt refining or salt-on-salt the process combined weak brine from seawater with mined rock salt, usually from Cheshire, and evaporated the brine into a white salt. As these sites were located on the coast, coal was readily available or suitable transport links existed to import it. The salt was brought by sea as rock salt. The principal locations were on the Mersey and Tyne estuaries, although others existed in the Lincolnshire, East Anglia and Essex. [33] They are discussed in greater detail below with reference to Cheshire Rock Salt.

28 Barford *et al* 1998, 38.
29 Tomlin 1982.
30 Hogarth and Heapy 1980; Hogarth 1982; Hogarth 1984; Hogarth and Binns 1986.
31 Berry 1957, 36–39; Hurst 1997; Woodiwiss 1992.
32 Berry 1957, Berry 1975
33 Barford *et al* 1998, 54–55.



3.3: Distribution of salt deposits in the United Kingdom, the image is overlain by the distribution of medieval and post-medieval coastal salt production and refinery sites. Based on Branford *et al* 1998, fig. 10, 12, 19, 20 with additional information from Lewis *et al* 1999, ill 2.13

4. THE CHESHIRE SALT INDUSTRY

Throughout history Cheshire has remained the predominate area of inland salt production in the country. It origins lie in the prehistoric period, but its importance continued through the Roman and medieval periods. The 19th century saw its culmination as the principal salt producing region, not just of the country, but, for a short lived zenith, also of the world.

Prehistoric salt-making

Salt-making in Cheshire dates back over 2000 years. Its origin lies in the Iron Age. In Droitwich, Worcestershire, physical evidence for Iron Age salt production was excavated in the 1970s and 1980s. [34] However, no sites have been identified for Iron Age salt production in Cheshire. Instead, the archaeological record consists of briquetage and Cheshire VCP (Very Coarse Pottery), a coarse low-fired pottery. These materials began to be identified from the early 1980s in the Marches (Herefordshire, Worcestershire, Shropshire and Wales). [35] It was only in the 1990s that similar pottery began to be found distributed in the north-west. Experimental archaeological work conducted by the Lion Salt Works Trust in the late 1990s has shown that these pots were filled with wet salt and left to air dry. [36] A résumé of the evidence for this type of briquetage and pottery in the north-west has been given by Michael Nevell. [37] Further research by Janice Kinory into prehistoric salt-making has placed the Iron Age Cheshire salt industry within its national context. [38]

Roman salt-making

The salt towns of Cheshire were first established by the Roman period at Northwich (Condate), Middlewich (Salinae) and Nantwich. This came in the wake of the Roman invasion and expansion into the north-west in the 1st century AD. Prior to the 1990s little evidence had been found for the Roman salt industry but a series of excavations in the 1990s and 2000s in Middlewich and Nantwich revealed excavated archaeological evidence of these industries for the first time.

In Middlewich, excavations occurred throughout the 1990s identified Roman settlement on King Street, Manchester Road and Chester Road, and virtually all of these contained evidence for salt production. The results of these excavations have been summarised by Dan Garner. [39] Further excavation on King Street in 2001–2002 revealed further evidence of Roman salt making. [40] Further archaeological excavation in 2012 has revealed evidence of Roman salt production at Jersey Way, Middlewich. [41]

In 2002 excavation at Kingsley Fields, on the west side of the town, revealed the fullest evidence so far recovered for the Roman settlement at Nantwich, a historic salt-producing centre in Cheshire (north-western England). Positioned along a Roman road was evidence for the collection and storage of brine and the production of salt, together with buildings, enclosures, a well and a small number of cremation burials. Waterlogged conditions meant that organic remains, including structural timbers, were well preserved on the site. These included the two finest examples of timber-built brine tanks excavated from Roman Britain. The report on these excavations by Peter Arrowsmith and David Power has been recently published. [42]

Despite the evidence from Middlewich and Nantwich, the archaeological evidence of Roman salt production in Northwich is poorer. Professor G D B Jones untimely death has meant that his excavations at Northwich are unpublished, although it is intended that his work will be published posthumously. [43]

Excavations from 1966 onwards have established that Northwich was a Roman settlement of some importance, it appears to have been named in the 3rd-century Antonine Itinerary as *Condate* (the

34 Woodiwiss 1992, 183–186.
35 Morris 1985.
36 Fielding 2005.
37 Nevell 2005.
38 Kinory 2012.

39 Garner 2005.
40 Dodd 2005; Williams and Reid 2008.
41 OAN 2013b; Ian Miller, Oxford Archaeology North, pers. comm., April 2013.
42 Arrowsmith and Power 2012.
43 Jones 1971; Jones and Reynolds 1983; Jones 1991; Jones 1992; Jones *et al* 1987.

confluence), which is doubtless a reference to its location at the meeting point of the Rivers Weaver and Dane. It lay on the east–west Roman road between Chester and York (Watling Street), mid-way between Chester and Manchester, only 2km west of its junction with the north–south road between Middlewich and Warrington (King Street).

The exploitation of brine springs during this period is demonstrated by the discovery of lead pans for use in saltworking. Four were discovered in the 19th century by the river to the south-east of the fort and a further one was found more recently in excavations at Ryders Place. [44] A 1st-century brine kiln was discovered close to the find spot of the four lead pans in 1968. [45] Further salt pans have been discovered at Nantwich and Shavington. [46] A discussion of these salt pans and what they may reveal about wider salt production has been undertaken by David Shotter. [47]

Medieval and early post-medieval salt-making

Archaeological sites that contain evidence for early medieval salt production in Cheshire are absent. Unlike similar sites from Droitwich, Worcestershire [48], no archaeological evidence can be discerned of continuity from the Roman to the early medieval period. It may be that Roman sites were abandoned at this time and then resumed later, or brine exploitation was continuous.

Before the Norman Conquest the Roman salt producing centres in Northwich, Middlewich and Nantwich developed the *–wich* element of their place name. Other centres such as Leftwich also appear to have developed at this time. [49] *Wīc*, was an early loan-word from the Latin '*vicus*', that was one of many words used to describe a settlement. The later diverse meaning bears little relationship to its origin. [50] In the later Anglo-Saxon period it developed a special meaning associated with salt-working towns where *wīc* denoted the buildings connected with a salt-pit or the town that grew up around it. [51]

The best documentary evidence for this period comes from the Domesday Book. This revealed that of the three 'salt towns' Nantwich was by far the largest and valued at £21, whilst Middlewich and Northwich were much smaller and valued at £8 each. The township of Northwich appears to have been extremely small and presumably originated as a small industrial enclave. The Domesday Book of 1086 describes the extent of the salt-works in the Cheshire region. Northwich was described as:

In the same hundred of Mildestvic there was a third wich called Norwich (Northwich), which was in farm at eight pounds. In it there were the same laws and customs as in the other wiches, and the King and the Earl divided the receipts in the like manner. All the thanes who held salt-houses in this Wich gave no Friday's boilings of salt the year through.

...All the other customs in these wiches are the same. This was waste when (Earl) Hugh received it; it is now worth 35s. [52]

Within Northwich in the early medieval period, it has been suggested that salt workers lived immediately east of the salt-producing area along Witton Street, in the adjoining township of Witton-cum-Twambrooks, based on the place-name derivation of '*wich-tūn*'. [53] The church serving Northwich is situated within Witton township, and its dedication to St Helen, mother of Constantine. This might indicate an early date, but need not do so. [54] Witton was not the centre from which Northwich was administered, as most of the salt houses were attached to the Earl's manor of Weaverham, 4km to the west. [55]

Throughout the later medieval period Northwich and Middlewich continued to be second to Nantwich for salt production. Data for Cheshire towns is rare because in the medieval period the

44 Petch 1987, 115–236.
45 Harris and Thacker 1987, 201–202.
46 Penny 1999; Penny and Shotter 1996; Penny and Shotter 2002.
47 Shotter 2005.
48 Woodiwiss 1992.
49 Bu'Lock 1972, 66–67.
50 Gelling 1978, 67.
51 Ekwall 1960, 515–516.
52 Harris and Thacker 1987, 366.
53 Dodgson 1970, 194.
54 Higham 1993, 83.
55 Higham 1993, 199.

shire was exempt from national taxation, having its own taxation system, the Mize. In the Cheshire Mize of 1405, Nantwich paid by far the highest amount at £7 3s. In comparison Middlewich paid 76s 10d and Northwich paid 67s 2d, the least but still the sixth largest amount in the County of Cheshire. [56] In 1580, the great chronicler William Camden writing in his Magna Britannica described the area:

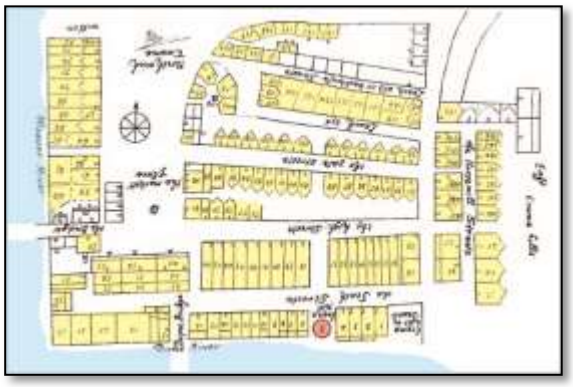
From thence runneth Wever down by Nantwich, not far from Middlewich, and so to Northwich. These are very famous Salt-Wiches, five or six miles distant, where brine or salt water is drawn out of pits, which they pour not upon wood while it burneth as the ancient Gauls and Germans were wont to do, but boil it over a fire to make salt thereof. [57]

At the very end of the medieval period in 1605 there were estimated to be 1,296 salt pans in operation in Nantwich, as opposed to 646 in Middlewich and 452 in Northwich. [58] These figures confirm the extent of salt-making in Northwich as stated in a letter received by George Johnson from Chomley, in February 1605; '*The said Northwich is a Burrow and holden of the Earle of Chester… There is, in the same towne or Burrow, one hundred and thirteen salt houses, every one containing four leads apiece...*'. [59]

The salt industry within the individual towns was closely regulated throughout the medieval period. 'Walling', the production of salt, was controlled partly to prevent the exhaustion of salt supplies, also to maintain price levels, and regulate the tolls levied on the sale of salt. The number of days worked by salt houses was strictly regulated and salt working took place in defined areas of the town (e.g. Nantwich's 'Walling Land'). [60]

Salt working was carried out along the banks of the River Dane. The process of medieval salt-making relied on heating brine over a fire, but the pans were much smaller and generally made of lead not iron. The supply of brine at this time relied on natural springs or brine pits. Nantwich and Northwich each maintained one brine pit during the medieval period whilst Middlewich had two. [61] Camden describes the Northwich pit:

At Northwich there is a deep and plentiful brine pit with stairs about it, by which, when they have drawn the water in their leathern buckets, they ascend, half naked, to their troughs and fill them, from whence it is conveyed to the wich-houses about which there stand on every side many stakes and piles of wood. [62]



4.1: The early-post medieval salt-making district in Northwich, *c.* 1600. The wich houses appear to be along the River Dane at the south of the plan. There was one brine pit (in red). The plots are numbered 1-22 and 28-58.

A plan dated *c.* 1600 of Northwich shows the layout of the town and the salt-making area spread along the River Dane south of the market place (4.1). [63] Forty-six separate owners are mentioned.

William Smith, writing around the same time, says that the brine was then carried in wooden troughs covered with boards to the salt houses. [64] This area of salt-making measured 8 acres (3.2ha.), stretched from the Town Bridge to Boundary Street until it was extended to The Cut after 1784. Two acres (0.8ha.) close to the salt houses were

56 Booth, P H W, 1985.
57 Camden 1580.
58 Hewitt, 1929.
59 Quoted in Calvert 1915, 76.
60 Barford *et al* 1998, 37.
61 Barford *et al* 1998, 36.
62 Camden 1580.
63 Harleian MS. 2073, Folio 1 lib. 115, reproduced in Calvert 1915, 1084-1087
Plan. (See page 1087.)
64 Ormerod 1882,137.

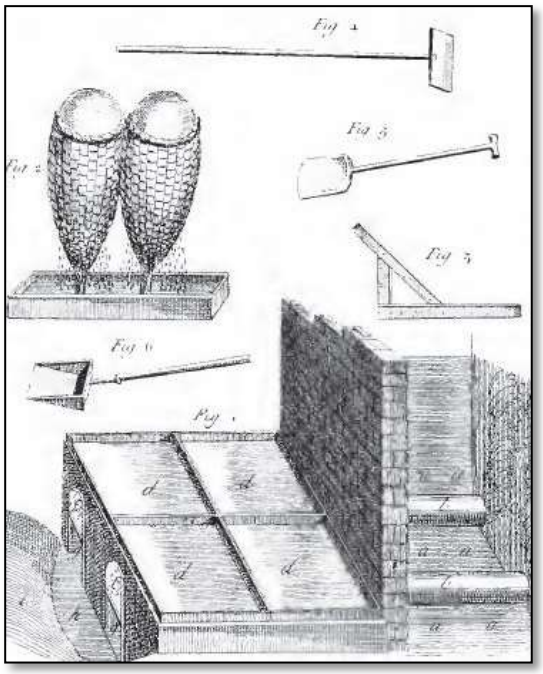
known as 'Crum Hills', where the impurities from the salt process were tipped.[65]

Archaeological evidence for the medieval salt industry is much scarcer with the principal evidence coming from Nantwich. The salt-working was carried out in simple open-ended, barn-like structures called 'wich-houses'. Excavations at Nantwich revealed two 12th-century-salthouses of different construction, one built of stake and wattle walls, the other of massive square earth-fast posts. [66] The principal internal feature of the Nantwich salthouses was a hollowed out tree-trunk, set into the floor and running the full length of the building. The 'ship' as it was referred to in contemporary documents was for storage of brine. It contained sufficient brine for 'four days walling' this being supplied to each salthouse at specific intervals. Excavations in 2003 by Earthworks Archaeology on Wood Street revealed the remains of a Nantwich 'salt ship' now on display at the Nantwich Museum (4.2). [67]

4.2: The Nantwich Salt Ship.

The salt ship survived due to waterlogged conditions preventing its decay. Evidence of medieval salt working in Nantwich survives well in the waterlogged ground and remains of timber buildings, salt ships and wooden barrels all show how important the salt industry was in the town. Brine was alternatively stored in the form of puddled clay troughs or barrels set upright in the ground. [68]

In the salthouses brine was heated over brine kilns or hearths in shallow lead pans, which in Cheshire were normally *c.* 3 feet (0.90m) x 2 feet (0.60m), and 6 inches (0.15m) deep. The pans were referred to as leads, and each Cheshire *wich*-house had six leads. One kiln would normally heat two pans (leads) placed together. William Brownrigg writing in 1748 in his 'Book of Common Salt', shows a wood-cut of one of these salt-making pans. [69] His pans were small and set in groups of four as opposed to two with the heat drawn from the fires by a small chimney (4.3).



4.3: William Brownrigg - small pans and furnace.

A 17th-century German wood-cut by Georgius Agricola shows the process in detail. The tools used in the salt-making process would have been similar to those seen in the early modern industry. Excavated evidence has uncovered wooden rakes to draw salt crystals to the side of the pan, and conical wicker baskets (barrows) in which the wet salt was drained and dried. [70]

The salt was traded via a network of pack-horse routes that radiated from the individual centres termed 'saltways', recorded in Central Cheshire. [71] Salt was transported over great distances; to Ireland via Chester, to Wales via Shotwick,

65 Curzon 1993, 27.
66 McNeil 1983, 61.
67 Arrowsmith and Power 2012
68 Hall 1891,169.

69 Brownrigg 1748 plate vi, fig. 1.
70 McNeil 1983, 82; Hurst 1997 106–110.
71 Crump 1939

northwards through Warrington to Lancashire, eastwards through Siddington and Macclesfield into Derbyshire and via Stockport and Longdendale into Yorkshire. From the 16th century onwards the term 'Saltwains' appears to have indicated that some of these routes were capable of taking wheeled transport. [72]

4.4: Agricola - Woodcut of salt-making.

The 17th century saw decline in the number of salt pans. In 1593 there were 89 salt houses in operation, out of an earlier total of 107, but by 1682 there were said to be only 23 leads in production in Northwich. [73] However, salt production had increased and by the end of the 17th century, Northwich was producing three times as much salt per week as Nantwich or Middlewich. [74]

This was due to technological change that saw iron pans heated by coal replace the earlier wood-heated lead pans. The change was driven by the transition from wood fuel, increasingly scarce throughout the 17th century, to coal. Riveted iron pans were introduced because coal produced too intense a heat for the continued use of lead pans. This allowed them to be larger than the old lead ones. The first iron pans were equal in size to the overall size of the six-lead groupings. [75] The transition occurred during the 1620s and 1630s at Northwich and Middlewich, much earlier than the Worcestershire centre of Droitwich. In the longer term Northwich was to benefit from the changes. It lay closer to sources of coal and the opening of the Weaver to navigation allowed the cheap import of coal and export of salt.

The discovery of rock salt beds and the development of 'Top Pit' salt-mining in Northwich also saw an increase in salt production in the town by the end of the 17th century (see below).

The 18th- and 19th-Century Salt Industry

Throughout the medieval and early post-medieval period the industry had been reliant on natural brine springs, and the industry was geographically limited to areas around the principal 'wich towns' (Northwich, Middlewich and Nantwich). Technological change, including the sinking of bore-holes and the development of pumping technology, meant the industry expanded into new areas of the Cheshire saltfields. The opening of the Weaver Navigation in 1734, and the subsequent opening of the Trent and Mersey Canal in 1771, allowed salt to be transported away from the works, and coal to be brought to them. Salt works develop along the along the banks of the River Weaver in Winsford and Northwich and along the Trent and Mersey Canal in Anderton, Marston and Wincham north-east of Northwich and in Middlewich.

The growth of the domestic market was stimulated by rapid population growth. The British population rapidly grew from 6½ million in the mid-18th century to nearly 21 million in *c.* 1850. In addition,

72 Berry, 1975, 80.
73 Cheshire Libraries and Museums n. d.
74 Cheshire Libraries and Museums n. d.

75 Barford *et al* 1998, 37.

the population went from being predominantly rural to having large urban concentrations due to migration to the industrial cities. This created new markets for preserved food, dairy products and leather goods, all of which required salt in production. [76] In 1835, the Government appointed a salt commission to review the existing salt tax. It recommended that Indian salt should be taxed to enable the sale of imported English salt and consequently, salt was imported from Liverpool. [77] By the end of the 19th century new markets emerged in the United States of America, Russia, Germany, Holland and Scandinavia. [78]

The story of open pan salt production is inextricably linked with salt mining in mid-Cheshire. The two types of salt production developed in parallel from the 18th century. Although at first there was no distinction between the two types, by the mid-18th century they were regarded as separate products. '**Rock Salt**' referred to mined salt, whilst '**White Salt**' referred to a variety of evaporated salt products produced from brine. In Northwich, white salt production continued to exceed rock salt production, with the exception of the middle decade of the 19th century. The boom years lasted from the 1850s until the 1880s when widespread salt extraction was occurring throughout the Northwich salt-fields.

Cheshire's primary position in the British salt industry had been established by the mid-19th century. By this time, Nantwich had a negligible market share. Salt-working ceased above Nantwich by 1808 and had ceased in Nantwich itself by 1847. [79] Middlewich continued to be a small production centre, but was for many years hindered by the lack of access to major transport routes.

The core of the industry was located in Northwich and the new centre of Winsford. These towns had a prominent geographic position suitable for export via the Trent and Mersey Canal and the Weaver Navigation to the port of Liverpool, Weston Point and Runcorn. In 1832, 202,790 tonnes of white salt were shipped down the Weaver from Northwich. The comparative total from Winsford was 154,800 tons (157,284 tonnes). In the same year 91,900 tons (93,375 tonnes) of rock salt was exported from both locations (see 4.5, 4.6). [80]

The industry in Winsford was centred on the River Weaver both above and below the town. It was almost entirely a white salt industry, with no rock salt occurring after 1890. The Meadowbank Mine, now the country's last rock salt mine, only reopened after the collapse of the Adelaide Mine (see below). By 1880 over a million tonnes of white salt were annually shipped down the River Weaver for export all over the world. Some two-thirds of white salt production was undertaken in Winsford. This marked change in the distribution of the salt production centres reflects the technological changes that allowed new salt fields to be exploited and encouraged the establishment of new works, primarily with good bulk transport links.

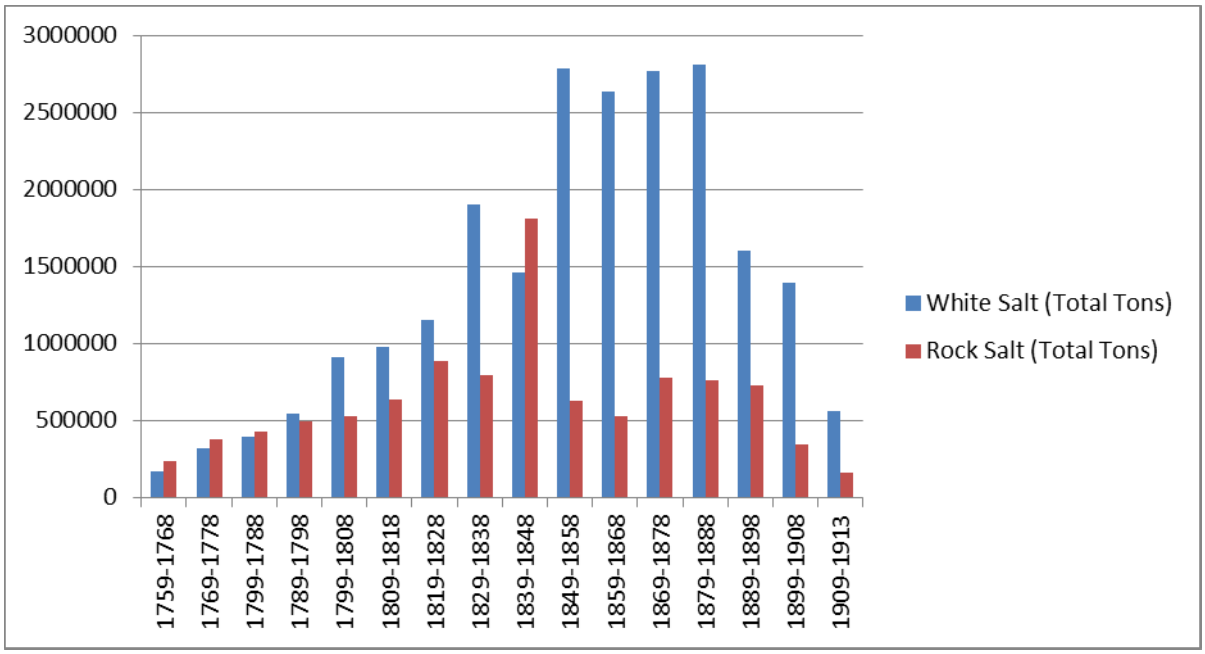
Open Pan Salt Making

Continued improvement of the manufacture of iron pans meant that by the later 18th century the small pans of the 17th-century period had been replaced by much larger pans. These were almost as large as the ones in the Lion Salt Works. Christoph Chrysel writing in 1773 in his 'Remarkable and very useful Information about the present Salt Works and Salt pans in England' notes a pan in Northwich:

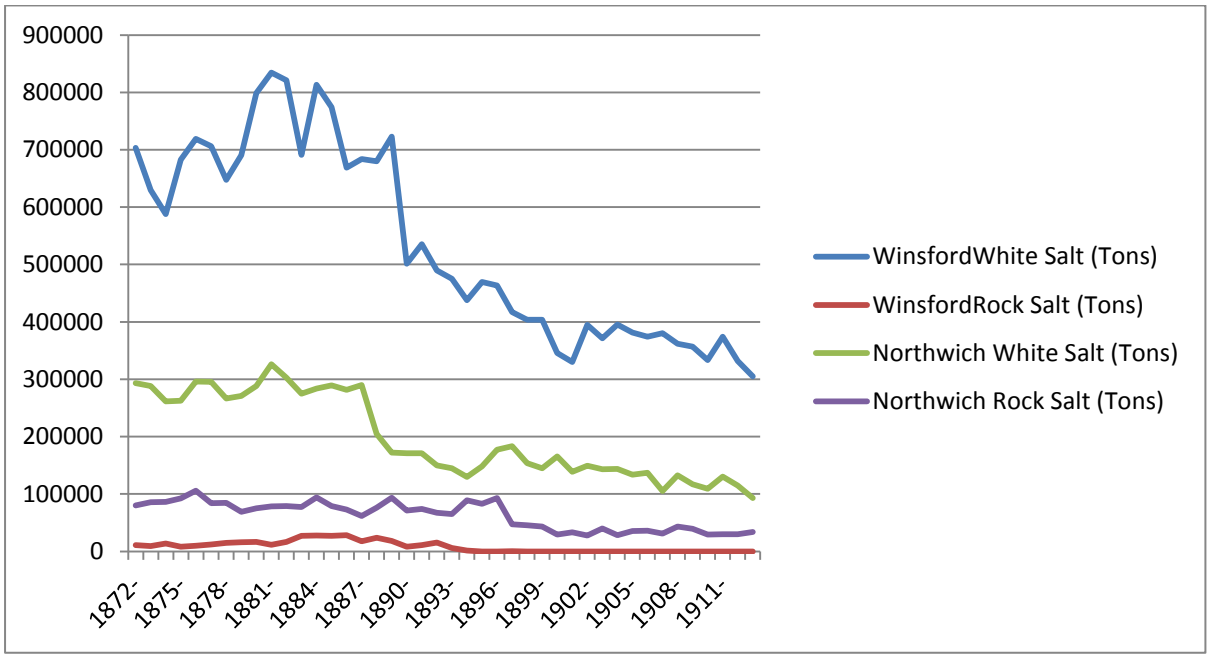
The first pan is 36 feet long, 25 feet broad and 13 inches deep and holds at one time 975 cubic feet of brine and has three furnaces. The second pan is 40 ft. long, 27 feet broad and 13 inches deep, and holds at one time 1170 cubic feet of Brine and has 3 Fireplaces. Both these large pans are still to be seen in England on the Baron's Quay Salt works near Northwich in Cheshire, where they are worked weekly and were built more than 4 years since.[81]

76 Rochester n. d. (a).
77 Rochester n.d. (a).
78 Parker 1933, 10.
79 Calvert 1915, 72.

80 Pigot and Co.'s *Directory* 1834, 47.
81 Chrysel 1773, quoted in Calvert 1915, 124.



4.5: In Northwich, white salt production continued to exceed rock salt production, with the exception of the middle decade of the 19th century. The boom years lasted from the 1850s until the 1880s when widespread salt extraction was occurring throughout the Northwich salt-fields. The figure above shows total shipment of salt down the River Weaver from Winsford and Northwich, until the First World War. [82]



4.6: Proportion of salt produced and exported down the Weaver, 1872–1913. [83]

[82] based on figures from Calvert 1915, 711
[83] based on figures in Calvert 1915, 490-491

Christoph Chrysel developed an improved system of salt-making for which he received a 14 year patent. He describes a process not dissimilar to that used at the Lion Salt Works, suggesting that it had reached close to its ultimate form by the 18th century. His improvement to the process developed the furnace beneath the salt pans and resulted in '*the least Fire and Coal the most Salt can be made and the greatest Profit received*'. The two types of salt normally produced were described by Christoph Chysel:

The fourth sort is Broad Salt, that is to say Coarse Salt, because it has larger crystals than the foregoing salt. It is made more especially in Cheshire in every salt works. The Brine from the Salt springs with a very gentle and moderate fire, in large pans is heated for 24 hours when large hard crystals are formed. It is drawn into Salt Tubs and allowed to remain on the sides of the Pans for 8 or 9 hours then taken to the Storehouse and thrown into a heap and allowed to lie until it is dry, which happens in a few days. I have seen it sold in two or three days and taken away. The price of this Salt at the works is 14 shillings per ton without the duty.

The fifth sort is Fishery or Flakey or Shivery salt. The Brine is heated with a very gentle fire for 36 hours for half a pan of brine or 72 hours for a full pan, when crystals of half an inch and ¾ inch cube are formed. This is sold at 20 shillings per ton without the duty and is chiefly sent to the Newfoundland Fishery without paying any duty, for all salt sold and shipped out of England pays no duty. On the contrary all salt used in England must pay a duty of Ten pounds per ton. [84]

By the 18th century, the development of pumping technology meant that 'brine shafts' could be sunk to the top bed of salt and the 'wet rock' tapped. Known as wild brine extraction or brine 'tapping' this involved the sinking of a shaft to natural brine streams below the ground that ran over the upper bed of salt. This was then extracted and used to make salt by the open-pan salt process. The process of brine-tapping involved the sinking of a shaft to the brine stream, a dangerous occupation. A F K Calvert describes the process: '*In sinking to many of the springs, the supply of brine, when cut into, was so copious that the sinkers had to flee for their lives, ascending the shaft amongst the brine, and having no opportunity of seeing what was underneath.*' [85]

In the later 18th century more efficient pumps allowed the brine to be pumped from deeper below the ground. Early pumps were either hand or horse powered. By the end of the 18th century both wind and water power had been adopted. In 1779 the introduction of 'Boulton and Watt' engines from their Soho Factory in Birmingham allowed deeper shafts to be sunk across the Cheshire salt fields. This resulted in the rapid expansion of the industry in areas such as Winsford and Northwich (see 4.8). One of the first Boulton and Watt engines was at John Gilbert's rock salt mine in Marston. Henry Holland suggests that by 1808 almost all new works used steam engines to raise the brine. They continued in use up until the mid-20th century. [86]

In about 1850, the quantity of easily obtainable rock salt began to diminish. As the rock salt mines collapsed (see above) brine from the rock head and water percolating down through the ground, thus creating vast underground reservoirs of brine. These reservoirs were increasingly tapped for brine and it became common to deliberately flood the mines to provide new sources of brine. This process was referred to as bastard-brine extraction. [87]

Initially the mines in the Dunkirk district were utilised, but became slowly pumped out (see 4.7 and 4.8 below for location of districts and mines). Connections were then made with neighbouring mines, until after 10–20 years the brine supply was again exhausted. Around 1870, Captain Townshend commenced to pump out his flooded mines, which were connected with the Marston group. As water in the mines was removed, several mines (Blackburn's, Neumann's, and Ellson's) collapsed bringing down the top bed mines. The water of a small brook drained into the depression left by the collapsing mines, and a lake was

84 Chrysel 1773, quoted in Calvert 1915, 124.

85 Calvert 1915, 294.
86 Rochester n. d. (b).
87 Calvert 1915, 213.

formed. At intervals, as the mines below become partially exhausted, the water of this lake broke in and replenished the supply of brine. [88] This can be seen by the large flashes that dominate the salt-making landscape, north-east of Northwich. Uncontrollable ground subsidence caused by bastard-brine extraction in Cheshire at the end of the 19th century was eventually recognised by the Cheshire Brine Subsidence Compensation Act of 1891.

This did not halt the process of brine tapping in the Northwich salt fields but instead led to a gradual migration of the salt works from the Witton and Dunkirk areas immediately to the north-west of Northwich to Wincham, Marston and Anderton. By the late-19th-century brine shafts and open pan salt works dominated the area along the Trent and Mersey canal from Wincham, through Marston to Anderton.

Rock Salt Mining

In the 17th century the first of a series of mines was begun in the Northwich region. A bed of rock salt was discovered in 1670 by the Smith-Barry family when they were searching for coal on the Marbury Estate, near Marston. This is believed to be the first mine sunk for rock salt into the upper bed of salt. [89]

This top bed of rock salt was relatively accessible and was extracted in the 18th century and early 19th century. Although the exact number of mines excavated in Northwich may be more, 61 have been identified. The vast majority of these are located in the triangle of land between Northwich Town centre, Wincham and Anderton. They now lie beneath the remains of the Witton Landfill Site, the realigned River Weaver, the Witton Brook and an area known as the 'Furey' near Winnington Hall. In Marston itself only two have been identified, 'Marshall's No. 2' and 'Marston Old Mine' or 'Gilbert's Mine', both located north-west of the Lion Salt Works close to the Trent and Mersey Canal. [90]

88 Calvert 1915, 213.
89 P.P. 1882 Report of Joseph Dickinson, Inspector of Mines (C 3241), 303.
90 Lynch 2004, 49–50.

The mines were sunk directly from the surface, with one winding shaft to each mine and were ventilated by means of an air-pipe and a fan. They did not usually extend more than 100 yards (91.4m) from the shaft. As the number of the mines increased, the workings from adjoining shafts occasionally became connected. [91] Often the mines were worked out until the brine stream, colloquially known as 'Roaring Meg', was encountered. For example: *'Heywood's Meadow in 1773. John Stubbs sank* [a shaft] *about 23 yards deep, and was then drove out by "Roaring Meg"'.* [92]

The top bed mines fell in as they became inundated with water penetrating either into the winding shaft or through the rock-salt into the marl above it, causing the roof to fall and allowing more fresh water to enter. The collapse of mines (see below – the post-industrial landscape), became endemic in the 19th century. They were often sudden and without warning. Ashton's 'Top Bed' Mine fell on October 16th 1838. At around 6am the ground collapsed carrying with it the engine house, rock-salt house, several outbuildings, a stable and wheelwright's workshop. Several men had already descended the shaft, whilst others on the surface plummeted into a huge chasm. [93]

By 1779, investigations in Lawton had identified a lower seam of rock salt. By 1781 at the Marston Old Mine a trial shaft was sunk through the existing workings and rock salt was discovered at a depth of 330 feet (100m), the bottom bed. After this, all mines in Northwich were sunk at this level. [94] The Daily Graphic described the working of the bottom bed mines.

In former days (from 1670 to 1780) the rock salt mines were all in the first bed of salt which is met with from forty to fifty yards from the surface. Now all the mines are in the bottom bed, and are at a depth of about 110 yards. The rock salt is blasted with powder, and there are tramways on the floor

91 Calvert 1915, 234.
92 Calvert 1915, 209, quoting John Weston's early 19th-century commonplace book.
93 Calvert 1915, 206; Lynch 2004, 18.
94 P.P. 1882 Report of Joseph Dickinson, Inspector of Mines (C 3241), 303

or sole of the mine on which trollies, bearing large tubs of rock salt, are conveyed to the shaft. In some mines ponies are used for the purpose in others men do the ferrying, as it is called. [95]

The rock salt mines in the bottom bed did not differ much from the original ones, but steam engines were used with direct shafts to the bottom of the mine. A greater understanding of the correct proportion of pillars and thickness of roof for support meant there were fewer collapses. [96] A total of 29 bottom bed mines were sunk in Northwich, of these half were in the Marston and Wincham district (4.8). This included:

Adelaide Mine, Blackburn's Old Mine, Blackburn's New Mine, Thomas Chantler's Mine, Crystal Mine, Littler's Mine, Marston Hall Mine, Great Marston Mine, Nelson Mine, New Zealand Mine, Poole Mine, Reynold's Mine (12 in Marston), Gibson's Mine, Old British Mine, Williamson's Mine (3 in Wincham).

The remainder were in the Witton and Dunkirk region. [97]

Like the top bed mines before them the bottom bed mines collapsed. After the collapse of Ashton's Mine, in the top bed, in 1838, it was not long before the bottom mines began to flood. By 1840 there were seven flooded bottom mines in the Marston and Wincham district, eight in the Dunkirk district, and two in Witton, near the Weaver. [98]

The mined rock salt had varied uses. Some was exported down the Weaver to refineries along the Mersey Estuary, for example, Dungeon and Frodsham. Here it was refined by the salt-on-salt process. This was a variation of the open pan salt technique, which involved dissolving sea water with rock salt and refining the salt using imported coal for fuel. [99] An example was excavated at Dungeon on Merseyside in 1990. [100] This practice survived into the 19th century with Cheshire Rock salt exported by sea to refineries on the Tyne, Fenlands of Lincolnshire and Essex. [101] Towards the end of the 19th century the Daily Graphic reported:

The rock salt thus obtained is used for a variety of purposes. Large lumps are placed in fields for cattle to lick. The largest quantity is exported to Holland, Belgium and Denmark to be dissolved in water, and afterwards made into white salt. A large quantity is used in chemical works and for metal extracting and some for agricultural purposes. Rock salt, however, forms only about one-tenth of the quantity of salt made or got in Cheshire. [102]

The Formation of the Salt Union

Throughout the 19th century the salt industry was prone to periods of over-production. Recession in the 1870s and counterproductive rivalry of salt manufacturers in Cheshire led to the failure of businesses throughout the 1870s. [103] One observer speaking in the 1870s summed up the situation:

The industry became a laughing stock to other trades. The trade is being ruled neither by common sense nor business experience….. All the skill and ingenuity of the salt proprietor has been spent in devising how he can best and cheapest carry his goods to his market. The rate of freight fixed half a century ago for small sailing craft and increased just as the transition state commenced, and continued under the new regime of steam flats and large barges when it might have been reduced, has been a source of unmitigated evil to smaller manufacturers. Instead of keeping the freight distinct from the price of the salt and drawing the amount on delivery of the salt in cash, it has been merged into the price of the salt which is sold f.o.b. By doing this the real selling price of the salt is hidden from view. The trade is gradually falling into the hands of the few who have the steam flats and barges. The Calcutta trade is now carried on entirely from Winsford, and Winsford is the centre that is now ruining the trade. ... To outsiders the state of affairs is positively lamentable—to small men it is certain ruin. To the inhabitants of the district, who see their property sinking and being destroyed by the fighting parties, the thing is

95 *The Daily Graphic*, 6 March 1890.
96 Calvert 1915, 234–235.
97 Lynch 2004, 50.
98 Calvert 1915, 212.
99 Barford *et al* 1998, 54.
100 Anon 1990.
101 Barford *et al* 1998, 55.
102 *The Daily Graphic*, 6th March 1890, 4.
103 Calvert 1915, 501–502.

outrageous, and very bitter feelings are being produced. [104]

The price of exported salt to India and the price of salt on the domestic market fell throughout the year. This gradually drove many of the smaller manufacturers out of business.

In response the Salt Union was formed in October 1888, with a capital of £4 million pounds, by the merger of over 90% of Britain's salt manufacturers. [105] Sixty-four firms sold their interests to the Salt Union, receiving two-thirds in cash and one-third shares. The sale included existing salt works and all proven salt lands in Cheshire and Worcestershire.

The Salt Union was beset with problems from the start as the promotion expenses were high, and certain properties were taken over at inflated prices. Some contracts had been loosely drawn up leading to expensive litigation. Moreover, there was a general decline in the overseas markets for salt, in particular in India and North America. [106] The results were a large-scale rationalisation of the industry and closure of many of the older, unprofitable works in Cheshire. The county's share of the national white salt market declined from 86% in 1882 to 49% in 1913. [107] Salt districts at Teeside, Preesal in Lancashire, Staffordshire and Worcestershire were instead exploited by the Salt Union.

The 20th-Century Salt Industry

Rock salt mining declined in importance throughout the early 20th century. Between 1892 and 1928 the Adelaide Mine was the only working mine left in Cheshire. This became inundated with water and collapsed in 1929 (see Section 4.2.1, below). In 1928 the Salt Union reopened the Meadow Bank Mine in Winsford, [108] which still operation as the only remaining rock salt mine in Britain at the time of this publication.

The 19th-century salt industry in Cheshire was conservative and did not improve the process of salt making. However, the advent of the Salt Union allowed technological advances in the early 20th century. Early unsuccessful experiments to improve the salt production process included the Mond Gas Plant process and the Hodgkinson process. [109]

It was not until the development of the Vacuum Evaporation process that a successful alternative to open pan production was found. The process was first used in sugar refining as early as 1812 in Liverpool. It was applied to salt successfully in North America in 1885. [110] The Salt Union opened the first plant in Winsford in 1906, which was followed in 1911 by a further works at Weston Point. Brine was pumped directly from Marbury to the salt and chemical works at Weston Point on the River Mersey from 1882, but this was increased when the new vacuum plant was opened, despite opposition from the Northwich and Winsford industry. [111]

The Vacuum Evaporation process involved three sealed, conical, vessels, still referred to as pans, 18 feet (5.50m) in diameter and 60 feet (18.30m) high. These 'pans' are filled with brine, and steam emitted under low pressure in a vacuum. The steam passes from the first 'pan', to the second and third. The brine boils at lower temperatures in each 'pan'. The salt as it is produced falls to the base of the vessel and as removed, dried and packed by a series of conveyors. [112] These plants proved more fuel efficient, less labour intensive and gradually replaced the traditional open pans.

In 1937 the Salt Union along with Brunner Mond and United Alkali Company was acquired by Imperial Chemical Industries Ltd (ICI). [113]

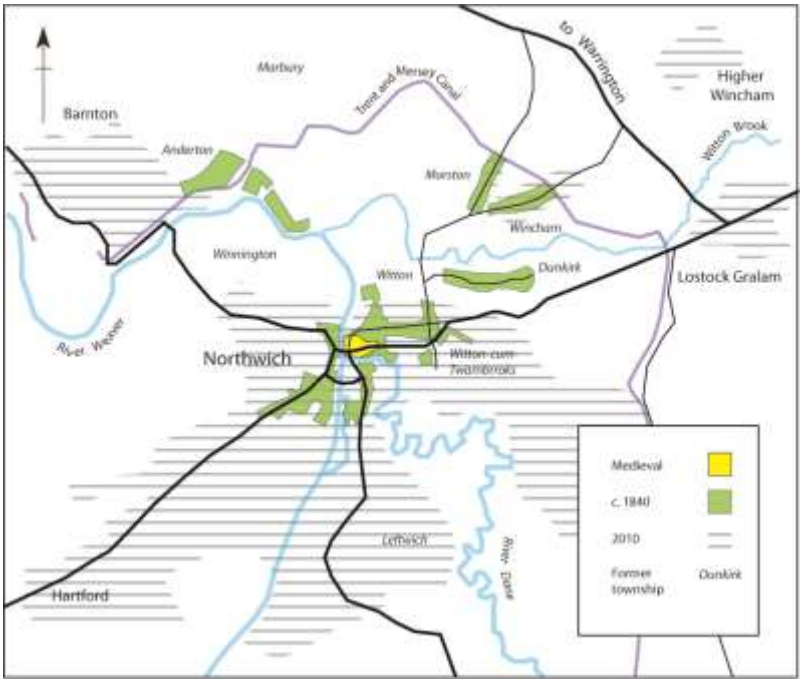
Open-pan working survived into the 20th century as it produced coarser grades of salt. As late as 1947 half of the UK's salt production was via the open-pan method. The 1950s saw the closure of many of the larger works. In 1948, ICI finally produced granular salt by shaping crystal in a strong up-current of brine, thus replicating the fine

104 Calvert 1915, 499–500.
105 Calvert 1915, 501–502.
106 Rochester n. d. (a).
107 Calvert 1915, 501–502.
108 ICI n.d.
109 Parker 1933, 6.
110 Salt Manufacturer's Association 1998, 17.
111 Cheshire Libraries and Museums n. d.
112 Parker 1933, 6–7.
113 Rochester n. d. (a).

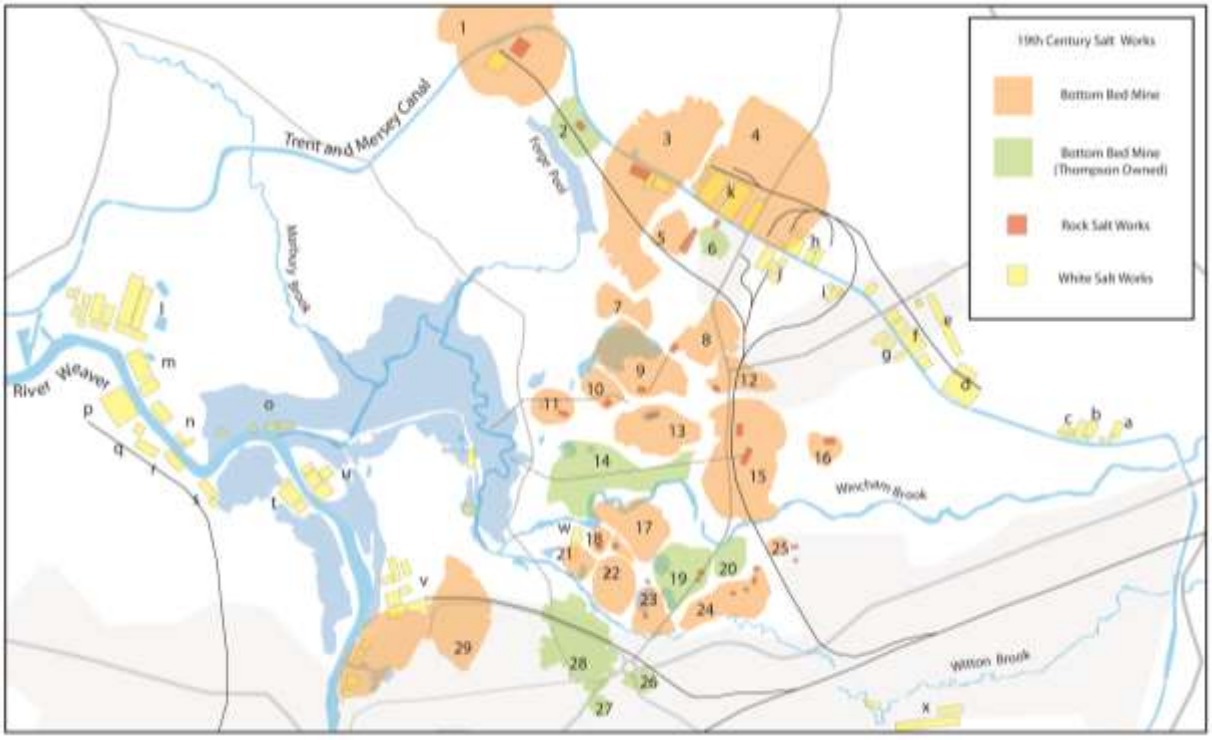
'African' grades of open pan salt. [114] This led to ICI closing their final open pan salt works in Winsford in the 1950s. [115] Cerebros took over the Middlewich family firm of Henry Seddon and Sons in the 1950s, and closed their open pan operation by the end of the decade. The last large-scale commercial open pan works, Murgatroyd's of Middlewich, closed in 1971. The Lion Salt Works survived as an anachronism of the industry until 1986.

By the 1990s salt production was concentrated in large-scale firms adopting the Vacuum Evaporation process. These included the New Cheshire Salt Works Ltd, based in Wincham [116] and British Salt in Middlewich, [117] now owned by TATA. Only the TATA owned Middlewich plant of British Salt survived in 2014.

114 Salt Manufacturer's Association 1998, 17.
115 Twigg 1993, 2.
116 New Cheshire Salt Works Ltd advertising brochure, *c.* 2000.
117 British Salt advertising brochure, *c.* 2000.



4.7: The extent of post-medieval Northwich in *c.* 1840 with townships discussed in the text.



4.8: Rock Salt Mines - 1. Marston Hall; 2. Pool; 3. Marston Old; 4. Adelaide; 5. New Zealand/ Gregory's; 6. Fletcher's/ Crystal; 7. Blackburn's New; 8. Ollershaw Lane; 9. Blackburn's Old; 10. Thomas Chantler's; 11. Littler's; 12. Gibson's; 13. Broady and Hadfield/ Townshend; 14. Platt's Hill; 15. British; 16. Williamson's; 17. Kent and Naylor's; 18. Tomkinson's; 19. Barton's; 20. Thompson's; 21. Ashton's Old; 22. Ashton's New; 23. Marshall's No 1; 24. Worthington, Firth and Co; 25. Worthington's; 26. Penny's Lane; 27. Neumann's; 28. Witton Hall; 29. Baron Quay.

White 'Open-Pan' Salt Works – a. Woodside; b. Sunbeam; c. Wincham Hall; d. Bridgefield and Victoria; e. Wincham; f. Wincham Patent Machinery; g. Imperial; h. Ollershaw Lane; i. Royal Oak; j. Alliance; k. Adelaide; l. British Company; m. Blackburn's; n. Spearman's; o. Littler's; p. Caldwells'; q. Marshall's; r. Handel's; s. Byeflat; t. Okel's; u. Island; v. Witton; w. Dunkirk; x. Bowman, Thompson and Co.

5. THE MARSTON AND WINCHAM SALT DISTRICT

Northwich contained a distinct salt district based around works within the town itself and distributed along the Weaver Valley and Witton Brook. Within the Northwich salt fields, but distinct from the main centre were a series of small settlements that had sprung up along the line of the Trent and Mersey Canal, exploiting the outlying north-eastern reaches of the salt beds. These included the villages of Marston and Wincham. Anderton to the north-west provided an interface between the Trent and Mersey Canal and the Weaver Navigation. Even prior to the construction of the Anderton Boat Lift in 1872, it was an important centre for the transfer of salt and other commodities between the two routes.

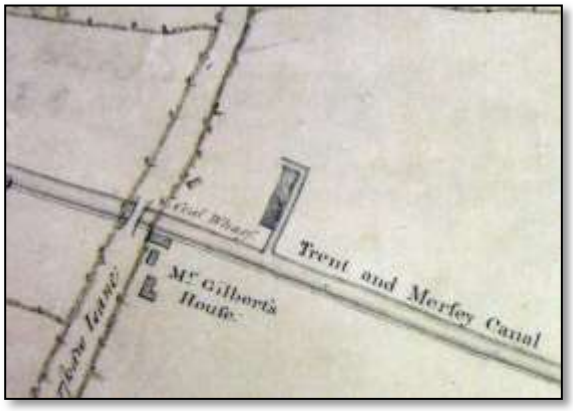
The Marston and Wincham Settlement

Marston and Wincham developed a distinct rural industrial character, based around the junction of roads over the canal, where salt works conglomerated. They maintain a semi-rural character to this day, due to their separation from the main urban spread of Northwich. This is in no small part due to the catastrophic subsidence of the late-19th and early-20th centuries that prevented development north and north-east of the town. Although set less than half a mile apart they are separate townships to this date. The boundary runs along the eastern side of the field directly east of the Alliance and Lion Salt Works.

Marston Township

The layout of Marston's core results from the development of salt working, both mining and brine extraction, in the area. The village has an essentially linear pattern formed by ribbon development along Ollershaw Lane. It currently extends from the canal bridge on Ollershaw Lane, south-west until the turn along the realigned road. At the turn of the 20th century it was much larger including the industrial complexes of several salt works as well as extending to the north along Ollershaw Lane.

In the 18th century Marston was a small, insignificant hamlet. The arrival of the North Staffordshire (later Trent and Mersey) Canal, which opened in 1777, was to radically alter the settlement. Brothers John and Thomas Gilbert were, amongst many other interests, engineers and land agents to the Duke of Bridgewater and the entrepreneurs behind the construction of the canal; they realized how salt could be exploited using the canal as transport. [118] Soon after the opening of the canal, rock salt mining began in Marston, in 1781. John Gilbert the elder, purchased the Symme Fields for £2,000 and subsequently developed the Marston Mine, to the west of the later Lion Salt Works site (see below).



5.1: The convenient location of both Ollershaw Lane and the canal meant John Gilbert built a house on this land plot adjacent to the bridge over the canal. 'Mr Gilbert's house' is shown on a plan, drawn in 1766 and updated in 1786. [119]

The village centre of Marston in the 18th and early 19th century was little more than a collection of houses. A plan of Marston, drawn in 1766 and updated in 1786, shows 'Mr Gilbert's House' on the present site of the Lion Salt Works (5.1). [120] This was later to become the Red Lion Hotel and is discussed in greater detail below (Section 6.1).

Between the 1840s and 1870s Marston developed rapidly as a community with the expansion of salt-working in the outlying region of Northwich (see 5.2, 5.3, 5.4 for details of this expansion). The majority of the terraced cottages along Ollershaw Lane date to this period of expansion. Further

118 CRO – DLT 4996/90/4; Matrix Archaeology 2012, Section 3.
119 CRO DLT 4996-90-4, 1766 Plan Marston updated 1786
120 CRO DCN 1984/66/32.

cottages were established on Cross Street on the western side. [121] Marston expanded along Cross Street in the final decades of the 19th century with more small workers cottages built along the eastern branch of the street. [122] In 1877, as part of this expansion, a terrace of four cottages was built on the eastern side of Ollershaw Lane; in 1899 these were converted into the Red Lion Inn. [123] These cottages are representative of the older houses in the village, which are typically 19th-century two-storey brick terraces. The majority of these buildings have been fenestrated, [124] but, in places, the original character survives. They have two-up, two-down plans, with semi-circular arched doorways and side passages leading to the rear.

5.2: The 1846 Marston tithe plan shows the western half of the site was then occupied by the Red Lion Hotel and its outbuildings, later to become the site of the Lion Salt Works. The eastern half of the site was then an arable field, named as 'Outlet', extending to 1 acre and 2 roods (0.6ha.); this field was later to contain the Alliance Salt Works. [125]

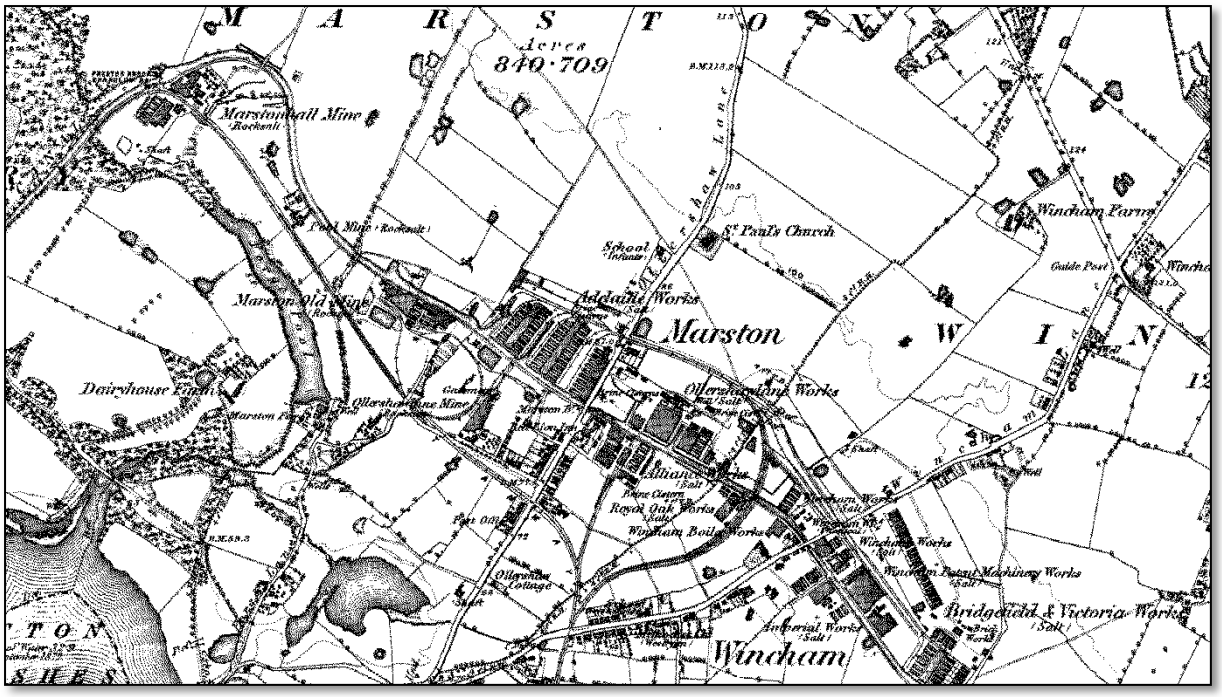
Many more buildings existed in the village in the late-19th century, including a series of ill-built cottages located within the complex adjacent to the Red Lion Hotel. These were known as the Red Lion Yard and were the location of an outbreak of typhoid in the 1890s, described in greater detail below.

The mine collapses and subsequent salt subsidence of the late-19th and early 20th century had a dramatic effect on the settlement of Marston. The principal late 19th-century subsidence occurred at the south end of the village, where the collapse of Neumann's Mine resulted in the large flash visible today. So dramatic was the subsidence that it caused the realignment of the road system, which originally ran directly south from the corner of Ollershaw Lane at the end of the village (see below).

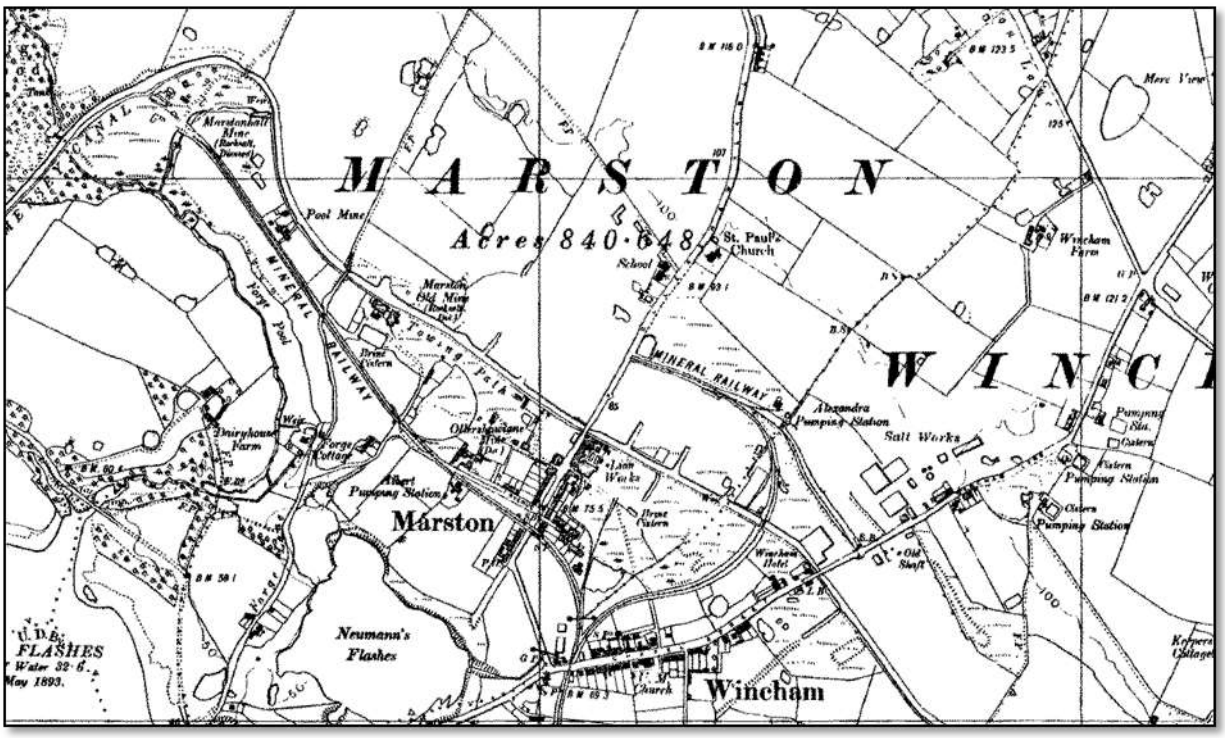
Within the settlement were three public houses on Ollershaw Lane: the Red Lion discussed below, the Rockminer's Arms (located in the vacant plot next to the Coronation Salt Store), and the New Inn, which still exists today as the Salt Barge.

5.3: St Paul's was a red brick church in the Early English style, from designs by Mr. John Douglas, architect, of Chester. Today, nothing survives of the church itself, but the attached village hall and the graveyard still exist. It was demolished in the 1930s as it became unsound due to the collapse and subsidence associated with the collapse of Adelaide Mine.

121 Ordnance Survey 1st edition 25-inch map, 1882.
122 Ordnance Survey 2nd edition 25-inch map, 1898.
123 Architects plans dated 1899, Lion Salt Works collection
124 Vale Royal Borough Council 2004.
125 Marston Tithe Map, EDT-263-2



5.4: Ordnance Survey Map, 1st Edition, Surveyed 1875, Marston and Wincham.



5.5: Ordnance Survey Map, 2nd Edition, 1898, Marston and Wincham.

To the north of the canal the collapse of the Adelaide mine in 1929, created the flashes either side of Ollershaw Lane. Originally, a small cluster of cottages developed at the entrance of the Adelaide and Ollershaw Lane Salt Works. The wider community were served by the church of St Paul that lay to the north-west of the village centre beyond the Adelaide Works. St Paul's was a red brick church with a large pointed arched window in the gable, Early English style, from designs by Mr. Douglas, architect, of Chester, and consists of chancel with vestry and organ chamber on the south side, nave, north aisle with porch and a low spire and turret containing one bell. [126] Today, nothing survives of the church itself, but the attached village hall and the graveyard still exist. It was demolished in the 1930s as it became unsound due to the collapse and subsidence associated with the collapse of Adelaide Mine. [127] On the opposite side of the road was Marston Church of England Infants' School, erected, with teacher's residence, in 1855, by public subscription, on a site given by the late Lord de Tabley. The original school was demolished and a new school was erected in 1891, at a cost of £1,590, for 224 boys and girls and 150 infants; average attendance, 224 boys and girls and 150 infants. [128] The school also closed in the 1930s due to the collapse of the Adelaide Mine. It was reused to house German prisoners of war in the Second World War, who helped rebuild the road where it began subsiding into the flashes. [129]

By the late-1940s, the Marston community was much smaller. Pat Furness, who worked as a paper girl in *c.* 1949, recalled the village. Behind the Lion Salt Works, there was a 'detached house', presumably the cottage on the Alliance Salt Works. The 'Old Red Lion Public House' was two cottages occupied by Burstow (No 42) and Cox (No 44). The Salt Barge was the only public house and was then known as the 'New Inn'. To the rear of the New Inn a cinder track led to 'two canal-side cottages', presumably Crystal Cottage, and was also the location of Burgess' Coal Yard. At the opposite end of the street the terraces extended to the corner as it turned to Northwich, with the Post Office at No. 1 Ollershaw Lane on the very corner. South of the Avenue and Cross Street ran the railway lines that originally continued to the Marston Hall Mine. [130]

The size of the township, remains largely unchanged since the 1940s. The Lion Salt Works remains an enigmatic remnant of the salt industry within a semi-rural district. The once continuous uniform nature of the 19th-century housing has been punctuated by newer buildings or 'gap' sites where subsidence or the risk of subsidence has prevented development.

Wincham Township

Wincham Township developed along the line of Chapel Street (formerly known as the Warrington Road), where it forked from Ollershaw Lane. It had already developed as a settlement prior to the arrival of the salt works in the 19th century. The settlement was fragmentary with a cluster of houses at the south-western end of the street, amongst which were a Wesleyan Methodist Chapel and a girls and boys school. A further small cluster of cottages existed north-east of the canal bridge.

A series of houses existed in the mid-19th century at the junction of Chapel Street/ Wincham Road and Ollershaw Lane. The subsidence and development of Neumann's Flash after the collapse of Neumann's Mine in the late-19th century saw the closure of the Warrington Road and its movement north-east of the salt fields. The south-western end of Wincham Township was abandoned and new houses developed along the street to the north-west and the canal.

Today, the community does not have the same characteristic 'village' feel of Marston. The absence of mines and proliferation of open-pan salt works within Wincham beyond the south-western end of the village has led to an alternative urban development. Former salt works have been given over to new land use, including large industrial factory units, retail outlets and a chalet

126 Kelly's Directory 1895
127 CRO D8645 LSW Mr Iredale, oral history transcript, *c.* 1989.
128 Kelly's Directory 1895.
129 CRO D8645 LSW Mrs Annie Lawton, oral history transcript, *c.* 1989.

130 CRO D8645 LSW Pat Furness, oral history transcript, 1990.

park. The surviving 19th-century buildings are situated at the southern end of the village away from the canal.

Marston and Wincham Salt Works

The Marston and Wincham townships expanded to serve a series of rock salt mines and white salt works. The Marston district was one of the earliest to develop rock salt mining, and for the majority of the 18th and early 19th century rock salt mines proliferated in Marston. The salt fields around Northwich began to close due to exhausted salt supplies and the effect of subsidence. There was a gradual movement out towards the more distant saltfields around Marston and Wincham. In the 1860s and 1870s white salt works proliferated along the line of the Trent and Mersey Canal (see 4.8, 5.4, 5.5).

Marston developed as a salt-working community prior to Wincham. The first salt mine in the district was sunk in the 1770s. Rock-salt mining was predominant in the area until the 1850s, after which many of the mines had accompanying white salt works.

In contrast the Wincham district developed later than Marston, and was associated predominantly with White Salt production. Many of the Wincham salt works were short lived, opening in the 1860s and 1870s. They were subsequently bought up by the Salt Union and many of the smaller works were closed as unprofitable. Some of the larger works were an exception to this rule and continued in production into the early part of the 20th century. One feature of the Wincham District was that the brine shafts and boreholes were situated in fields away from the canal. A series of pumping stations and brine reservoirs stored the salt prior to distribution through a series of brine pipes to the individual works.

Marston Hall (Hayes) salt works and rock salt mine

The Marston Hall Works or William Hayes Mine was located north-west of the Lion Salt Works along the southern bank of the Trent and Mersey Canal. It was sunk in 1850-1851 by William Hayes. It had two shafts, and a further air shaft both sunk 315 feet to the bottom bed. An old shaft of the former top bed mine the Marston Hall Old Brine Pit also existed on site. The mine and works was run as the Marston Hall Salt Company Ltd when it was sold to the Salt Union in 1888.

When Joseph Dickinson, Her Majesty's Inspector of Mines, visited in 1873 [131] he found that the:

'height of the working is 6 yards with the rock salt in the roof not quite firm. Pillars are 10 yards square and 25 yards apart but the roof having cracked, a set of pillars are now made 12 yards square and only 18 yards apart.'

Further movement of the roof led to the building of twenty timber cradles to support the roof, many along the line of the canal directly above. In 1869 Marston Hall Mine was the first mine in the area to install a grinding mill, something which would have increased output considerably. The mine owned 21 narrow boats, a coal boat and 2 open boats they also had a dry dock where these could be repaired.

The mine was sold to the Salt Union in 1888 for £25,182. At the time of the Salt union acquisition it was described in detail. The mine was 32 acres (13ha.) in extent but continued to be exploited by the Salt Union until 1905 eventually reaching 40 acres (16.25ha.) in size. Above ground it was 9 acres in size with four dwellings houses, four cottages, a smithy, stables, storerooms, paint shops and an office. In addition there was a yard, loading docks, a repair docks and boat workshops for 21 narrow boats, two open boats and a coal boat. The works were split into two: to the south-west the salt works and to the north-east the mine (see 5.11 below).

An inventory of the salt works stated it had 12 salt pans, brine shafts, pipes, engines, cistern troughs, fresh water tank, furnace, steam pan stove, water hut, 2 drawing engines, salt rooms, fishery warehouse, stage, 2 hothouses, stove flues, storerooms, stage table, lath mill and engine, tubs, 3 large chimneys, 3 small chimney pipes, wooden

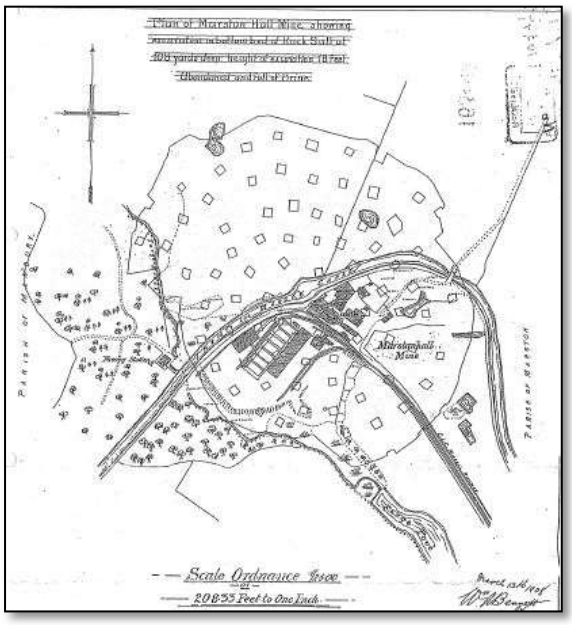
131 Report of Joseph Dickinson, Inspector of Mines; P. P. 1873 (C3241).

shed, 14 salt carts, 28 barrows, 600 feet of water and steam piping and an iron press.

The salt mine was listed as having shafts, air compressing machine, 2 boilers and pipes, winding engines and ropes, rock mills and engines, 3 large boilers, steam pipes, water cistern, rock mill house, rock shed, hut, rock mill chimney, saw mill, drilling machine, powder magazine, rails in mine (altogether 2 miles), 20 trucks, 20 rock salt tubs.

The Salt Union Inventory of Properties of 1908 [132] lists:

Included with Marston Pool mine; 12 pans, hot houses, stoves, brine shafts, dwelling house, 4 cottages, Marston Hall Mine, Pool mine, rock mill, branch railway etc., the Marston Hall Salt Company, Limited. The whole of the pans and buildings are dismantled. The mine which was last worked in 1905 is flooded. The rock house and dwelling house are being dismantled. The whole of the property is on subsiding land. The brine shaft situated in a field near Adelaide works is filled up. The 4 cottages are in fair order.



5.6: Plan of the Marston Hall Mine by William Bennett, 1908. [133]

The mine collapsed in 1907, an event described in greater detail below. The abandoned mine was surveyed by William Bennett in 1908 (see 5.6, 5.7). The survey shows, the site on the surface was split into two with the salt works in the south-west and in the north-east a series of buildings that served the mine.

5.7: Marston Hall Mine, after the collapse of the mine and breach of the canal in 1907. The picture faces north and the turn of the canal can be seen in the background. The buildings beyond the breach are the mine buildings in the north-east of the site.

Remains of the salt works are located in woodland south-west of the Trent and Mersey Canal about a mile north-east of the Lion Salt Works. The land on which the salt works stood is now about 6m (20 feet) below the level of the canal, and subsidence is still taking place along the line of the canal, as evidenced by the surface of the towpath being below water level and by the presence of fresh concrete along the towpath edge to contain the water.

The remains survived as earthworks surrounding the remains of Forge Pool. The remains were surveyed and excavated in 1993 and survived as lines of brickwork foundations. [134] This included and engine base built of sandstone blocks and a well preserved reservoir with earth banks. To the south-west of the pool was a complex of earthworks 110m long and 60m wide. These included three large square structures and seven smaller rectangular structures that archaeological excavation showed to be the remains of pan houses and pan kilns.

132 Salt Union 1908, 27, entry 99, CRO DIC/SU9/1
133 Calvert 1915, 245

134 Horton 1993, 23-43

The remains now lie on private land and have been used for recreational off road driving. The area looks to be continuing to subside on either side of the canal in this location.

Marston Pool rock salt mine

Pool Mine was located along the Trent and Mersey Canal, north-west of the Lion Salt Works. It was also known as Poole Mine, Marston Pool Mine, John Thompson's Marston Mine and J. Thompson and Sons (5.8). It was a small mine about 6 acres (2.4ha.) in size. It was opened in 1846, and was part of the properties owned by John (Junior) and Henry Ingram Thompson. The 1875 Ordnance Survey Map shows that it did not have any salt pans at the surface, and simply operated as a salt mine. It was sold to the Salt Union in 1888.

5.8: Marston Pool mine seen from the south, showing a new subsidence hole beginning to form. [135]

The Salt Union report of 1908 [136] stated that it was included with Marston Hall Mine when this was purchased in 1888.

This mine was also used to store explosives during and after the First World War. This had to be kept dry and therefore regular pumping of the mine became essential. Pumping continued at Pool Mine on a weekly basis to prevent flooding and inundation from workings in adjoining mines. By 1925 this had become a costly business. Per week it was estimated to cost: '7 ton of coal, 2 men half a day plus an engine driver, pumping water 6 hours for winchman and 3 hours to get up steam, carting of coal and ashes, insurance of boiler, cleaning of flues and general repairs to buildings'. As costs escalated a decision was taken in January 1929 to seal up the shafts.

Although this was connected to the old course of the canal, which was bypassed in 1958, part of the canal arm can still be made out, as can the ramps up to the bridge, which carried the towing path over the entrance to the dock.

The remains were surveyed and investigated in 1993. This recorded the survival of stone and timber remains of a canal arm and associated sluice mechanism. Elsewhere the remains of linear earthwork banks, up to 2m in height were believed to be the remains of a series of pools. [137] A watching brief was conducted on large scale earth moving in the area, dated to 1997. The only survival of this record was a series of photographs now and it is not clear how they affected the remains. [138]

Marston Old Salt Works

This was the earliest and the longest running rock salt mine in Marston. It was also known as Bourne and Co.'s Mine; Great Marston Mine; Fletcher and Rigby's Mine; and Marston Top. At its maximum size it was approximately 40 acres (16ha.), and extended 200 yards (183m) to the north of the canal and 300 yards (274m) to the south. [139]

The salt works was originally in the possession of Nicholas Ryder, as noted in a deed of 1776. This probably related to a top bed mine. The Osborne's Guide to the Grand Junction Railway of 1838 (see below) dates the opening of the mine as 63 years prior to its publication which would put the date at 1775. The deed of 1776 states that a '*lease of salt works and brine springs within an estate in Marston for 50 years'*. The lease was between from Thomas Lyons to Messrs Matthew Lyons, Thomas his son, and Mr [John] Gilbert. This also included a deed of co-partnership between the purchasing parties for carrying on the salt trade.

135 Lynch 2004
136 Salt Union 1908, 27, entry 99, CRO DIC/SU9/1

137 Horton 1993, 41
138 These photographs are believed to have been taken by Andrew Fielding, Project Officer for the Lion Salt Works. They are now in the Lion Salt Works Photographic Collection
139 Horton 1993, 44

John Gilbert, was a land agent for the Duke of Bridgewater. He raised £1,000 from the Leicester family of Tabley Hall in order to develop the Marston Mine. At this time, he also purchased Symme Fields, on which the Alliance and Lion Salt Works stood for £2,000 from Thomas Barlow, silk merchant. This appears to have been part of a policy of buying up interests in the area. The Marston Old Mine was first noted on a map of 1786 as Gilbert and Bourne's salt works.

By the 1820s the Marston properties and salt interests had passed to John Gilbert (Junior) the son of John Gilbert. He appears to have sold his interests in the salt business and properties in Marston.

The Marston Old Mine was also the first mine to exploit the bottom bed of rock salt. The presence of a bottom bed was originally discovered in Lawton in 1779. Because of this an experimental shaft was sunk through the upper bed of the Marston Old Mine in 1781. This proved that the bottom bed also existed in the Northwich salt field. The salt in this bed was much purer, and all mining took place in the bottom bed after 1781.

John Gilbert used steam powered pumps and winding gear to exploit the lower bed. He agreed on behalf of his partners to pay Boulton and Watt £50 per annum for a license to use a 10hp steam engine for the purpose of drawing or winding rock salt and pumping brine out of a '*certain mine called Marston Rockpits situate near Northwich on the Trent and Mersey canal*'. [140] It was able to raise 9 cwts (457kg) of salt the 120 yards (110m) to the surface.

This engine was giving trouble by 1795 apparently owing to bad servicing. Boulton and Watt's engine erector wrote: '*I this morning went to Mr Gilbert's engine which I find in a damnable plight – as there was only one engine man and a clerk, 2 stupid dogs … The noise of the working gear may be heard almost a mile [away]*'. Later he reported to Mr Watt, '*I have a letter from Mr Gilbert on Monday desiring me to get the engine at Northwich put in orders as soon as conveniently could as they expect large orders for salt when the [wartime] embargo [on shipping] was taken off in Liverpool*'. 17th April 1795. [141]

The Marston Tithe Map of 1846, shows the works as an accumulation of buildings in the location of the salt works owned by Thomas Lyon and leased to Thomas Firth and Co as the Marston Salt Company.

Shortly prior to the tithe map the mine was described in the 1838 Osborne's Guide to the Grand Junction Railway:

Information for the Travelling Public about the Rock Salt Mines of Northwich (extracts). There are many mines of rock salt in this neighbourhood, the principal one is at the MARSTON WORKS, the property of Messrs Worthington and Firth.

These are the oldest in the place; and the first engine that was ever erected for the working of salt mines is still at work here, and in very good repair. Formerly, water or windmills were employed in the pumping of the brine, and the remains of a pump of this kind are still to be found at Winsford. The Marston pit was sunk about 63 years ago, when a bed of salt was found 60 yards below the surface of the ground. This bed was worked for some time, and others were sunk through, until the present bed was found, which is 50 yards lower, being 112 yards from the surface. There are three shafts into this mine, and another shaft in the midst of the mine, in search of a better bed, which has not as yet been discovered.

The shaft is so free from drippings and dirt, that we need no miner's clothing for going down. Ladies as well as gentlemen, peers and peeresses, princes and potentates of all nations, have been down this mine.

The Grand Duke Michael of Russia went down when in England a short time ago. On a late occasion (the Meeting of the British Association for the Extension of Science, at Liverpool), eighty of the members of the association, by the invitation of the proprietors, visited this mine.

The principal parts of which were illuminated with upwards of 4,000 candles, tastefully displayed

140 Horton 1993, 44

141 Chaloner 1961, 72.

against the glittering rock, and a table was placed for the gratification of the company, decorated with flowers and wax lights, supplied with every delicacy, and a profusion of the choicest wines, to the charms of which, it appears, these philosophers were not insensible. Having alighted, we find ourselves in a large open gloomy-looking cavern, but on proceeding further, we perceive, at an immense distance, some glimmering lights.

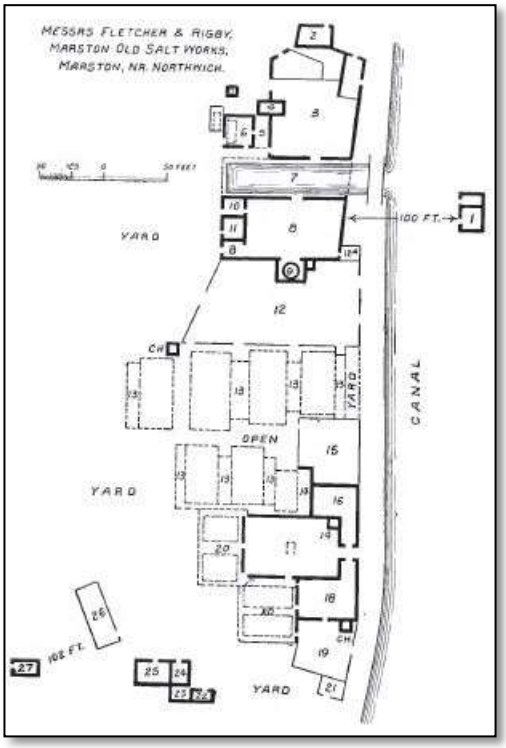
At every twelve or fifteen yards there are prodigious pillars supporting the roof, and varying in size from twelve to twenty yards in diameter. Some of them are thirty yards long and twelve broad, giving us a pretty good notion of what the Hindoos' fabled pillars must be, that bear the world. Many millions of tons weight rest on these pillars. The bottom of the shaft, where we alight, appears a circular spot of moonlight. From places where a fracture has taken place, the light is reflected as from thousands of lustres. In some parts pillars have been removed, leaving a mass of hanging rock overhead, which appears awfully grand.

The extent of the present excavation is about twelve acres, and they contain from one to two hundred of these enormous columns. Rows of them rise on either side, as we walk along this magnificent subterraneous region. The 'feet' or, 'eyes' of the shafts have the appearance of domes and spires when we look up, adorned with salt stalactites hanging down in beautiful droppings. The explosions which the blastings occasion, are tremendous thunderings, which shake the whole mine, and reverberate in awful volleys throughout the caverns long after. [142]

The Marston Old Mine was again visited by the late Emperor Nicholas of Russia with the Royal Society of Liverpool in 1844. [143]

By the 1870s the salt works was known as the Marston Old Salt Works or Marston Old Mine and was operated by Fletcher and Rigby. It continued to be used as a mine but also produced white salt by evaporation in a series of pans. Thomas Ward's plan of the mine, dating to the 1870s or 1880s (5.9) shows a network of eleven open pans and four storehouses with two chimneys on the eastern side of the site; whilst on the western side of the site was a canal basin and a series of buildings that may have been associated with the mine and storage of rock salt. The plan equates closely to the Ordnance Survey 1st edition of 1881-1882. [144]

The salt mine and works was sold to the Salt Union on the 19th July 1888 for £7,457 10s. The works were owned at the time by Thomas Henry Lyon and run by Fletcher and Rigby. The works were finally conveyed to the Salt union in 1897 almost a decade later, possibly due to the complicated ownership. They were subsequently pulled down.



5.9: Marston Old Salt Works, Sketch Plan by Thomas Ward, *c.* 1880. [145]

The Salt Union Inventory of Properties 1908 lists the following:

Lands, salt works, Rock salt mine, rock houses, storehouses, 11 pans, brine reservoirs, 8 cottages etc. Marston Old Mine and works, Fletcher and Rigby. The mine is dry, but the salt is worked out to the old boundaries. The pans have been removed.

142 Lynch 2004, 34–35.
143 Morris and Co.'s *Directory* 1874.

144 Ordnance Survey, 25-inch map, 1st edition, 1881-1882
145 Calvert 1915, 698

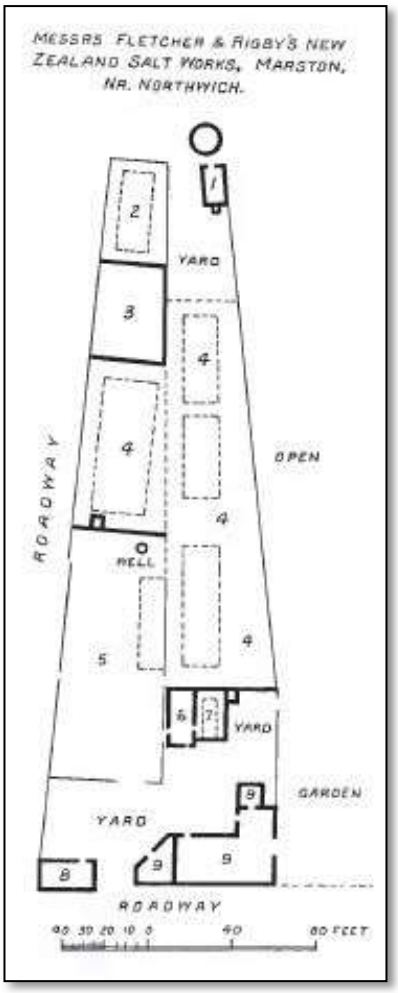
Some of the buildings still remain but are in ruins. 10 cottages are tenanted. But in very poor condition, being on sinking land. 1 cottage is untenable. [146]

The top bed mine was preserved intact until the roof cracked and water started to enter in 1921. The mine was abandoned in 1924. This mine was also used for storing explosive. Subsidence has continued from that date to the present day. One of the shafts collapsed in 1933, and the hole continued to grow despite continuous tipping. By 1955 the crater was threatening the canal, and a new stretch was dug to bypass the sinking area, being opened in 1958.

The surface remains of the Marston Old Mine lie in woodland south of the new cut of the canal, on the line of the old cut. The mine continues to subside and the stretch of the 'new' canal nearest to the shafts shows signs of recent movement. Historically the canal edges have been raised many times with fresh concrete, and part of the towpath has again dipped to water level. In the field opposite a lake which formed a few years ago, is gradually increasing in size.

New Zealand salt works and rock salt mine

William Furnival bought the site in about 1828 and began to produce salt by his new patented process, which produced more salt for less money spent on fuel. He had originally adopted the process in Worcestershire where it proved successful. However, the competition was not welcomed by other salt manufacturers. A price war ensued in which other salt manufacturers sold their salt at a loss until he was forced out of business, selling the mine on the 1st September 1831. [147] It was recorded in the indenture as having 'two shafts into a mine and one brine shaft'. It continued to operate and was run by H Back until 1833 and after this it was run by William Gregory. It appears on the Marston Tithe map in 1846 as belonging to William Gregory. It is not, however, clear if it was operating during the intervening years.



5.10: New Zealand Salt Works, Marston, sketch plan by Thomas Ward, 1870-1880s. [148]

It appears to have been reopened or begun to be reworked in 1869, and this is the date given by Campbell Calder for its origins. [149] It operated as a small mine, only just over 2 acres (0.8ha.) in size. It was known by a variety of guises including Marston Gregory's (Gregorie's) Mine; Greyacres; Fletcher and Rigby's Mine; Johnson, Fletcher and Others'; Fletcher's Mine; and the Ollershaw Lane Mine.

By the 1870s when it was planned by Thomas Ward it was known as Fletcher & Rigby's New Zealand Salt Works (see 5.10). It formed a triangular land plot with a total of five or six open pans, a single storehouse; at the northern end of the site was a gasometer, whilst at the southern end was the engine house, rock house and a

146 Salt Union 1908, 25, entry 99, CRO DIC/SU9/1
147 Calvert 1915, 657–669.

148 Calvert 1915, 699
149 Horton 1993, 47

dwelling facing onto the roadway that is today known as The Avenue.

The mine was purchased by the Salt Union on the 21st July 1888, for the price of £6,500 from Johnson, Fletcher and Others.

The Salt Union Inventory of Properties of 1908 [150] lists the following:

Land and salt works containing 5 pans, storehouse, 2 loading stages etc, also dwelling house, stable etc, and mine, rock house, engine house etc. The works were dismantled in 1889. The house and stable are on subsiding ground but are in fair order and tenanted by Mr Rayner. The mine is filled with brine. The rock house remains but is in ruins. The engine house has been demolished.

The mine was listed as flooded in 1908, and was out of use with the shafts filled in by 1920. There were two rock shafts and a brine shaft. Campbell Calder [151] notes that on 20 December 1920: '*S Pimlott began to fill up the New Zealand shafts. It only took 2 canal boats full of concrete rubble and rubbish from about the old rock house foundations to fill them up. The work was finished on 24 December.'*

The site in 2014 forms part of a land plot used by Northwich Metals as a scrap yard.

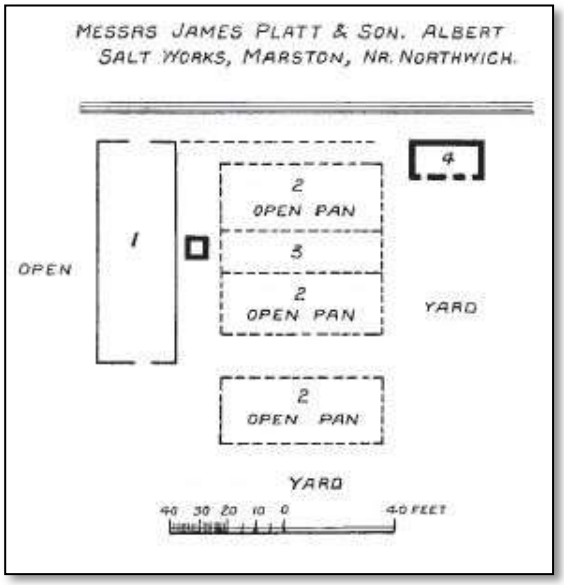
Crystal salt works and rock salt mine

The Crystal Mine was located to the west of the Lion Salt Works in a now vacant land plot. It was a small mine of only about 2 acres (0.8ha.). It operated from *c.* 1850. The date of sinking come from a date stone, located at the works on the 19th February 1925. Calder noted that 'S Pimlott was pulling down the engine house and removed a stone in the wall dated 1850, in 1928 this was in the Coronation Garden'. [152]

Originally it was known as Fletcher's Marston Mine; Fletcher and Co; Johnson Fletcher's Mine. By the 1870s it was known as James Platt and Sons Albert Salt Works, having three open pans and a warehouse (see 5.11). It eventually came into the possession of the Thompson family and was also known as Thompson's Mine. [153]

It was sold to the Salt Union in 21st July 1888 as part of a lot with the New Zealand Mine (see below). At this time it was a rock salt mine known as the Crystal Mine. It contained:

Engine House, Rock House, land adjoining with salt works, coal yard and wharf, dwelling houses, garden lands, small gas works, railway sidings, the salt works included 3 pans, 1 warehouse, office etc.. and was known as the Albert Salt Works of James Platt. Bought for £6,700 on the 6th Oct 1888.



5.11: Crystal (Albert) Salt Works, Marston, sketch plan by Thomas Ward, 1870-1880s. 154

By 1908 the Salt Union Inventory of Properties listed:

Rock salt mine known as the Crystal mine, with engine house, rock house, land adjoining with salt works, coal yard and wharf, dwelling house, garden lands, small gas works, railway sidings. The salt works included three pans and a warehouse, office etc. It was known as the 'Albert Salt Works', of James Platt. Mine and shaft are in good order, buildings not in workable condition. Not been operated since formation of the company (in 1888). Dwelling house in fair order, salt pans and

150 Salt Union 1908, 25, entry 91, CRO DIC/SU9/1
151 Calder 1921.
152 Horton 1993, 50

153 Calvert 1915, 695
154 Calvert 1915, 695

warehouse dismantled. Gas works in poor order and out of date. [155]

The Crystal Mine, along with other mines, was used to store unwanted shell explosive, known as lyddite, during the First World War. This was still there when water broke into the mine and flooded it in 1920. All 10,418 boxes of picric acid stored in the mine, (equal to 520,8841bs of explosive), were lost and are still down there to this day. The shafts were filled in 26th July 1920 and the 11th November 1920, and the engine house was pulled down in February 1925, [156]

5.12: The Crystal Cottage, the last remains of the Crystal Mine, dated 2014

The salt works and mine are not visible today. The area has seen partial subsidence. The mine manager's house known as Crystal Cottage and a small brick shed that was probably the mine weighbridge house still survives (5.12, above). According to Norman Eaton, it was *'Fred Burgess' house [Crystal Cottage], with outbuilding going up to the canal, he was born there in the late 1870s and only died a few years ago in the 90s'.* [157]

The Crystal Cottage was renovated in the late 1990s and is still occupied today. Around the buildings the area is pasture and gardens with no trace of the salt works.

Adelaide salt works and rock salt mine

A rock salt mine was sunk in the bottom bed by Woodyatt and Eauchus in 1852. They sold it a year or so later to Messrs Verdin. The Verdins worked it under the name J Verdin and Sons (Rock Mine) and Verdin's Marston Mine until the formation of the Salt Union in 1888. It was described as having twin shafts and a relief shaft and engine being added later. The mine was served by two shafts 112 yards (102m) deep (see 5.13, 5.14, 5.15).

At the foot of the shafts was an area known as the 'crystal ballroom'. In the 19th century public dances were held in the vast cavern and fairy lights were suspended from the mine roof, cascading sparkling reflections on the walls and pillars of salt, as the strains of a waltz, or a foxtrot, echoed through the chambers. [158]

A chimney, 84 feet high, fell at the Adelaide salt works, Marston, in January 1879, causing a great deal of damage to adjoining buildings. The chimney had been out of perpendicular for some time. A team of men had been engaged to place the structure in its original position. They were using screw jacks when the giant chimney suddenly collapsed. [159]

5.13: A Salt Union locomotive shunting wagons by the pit head gear of the Adelaide mine. There is a canal arm immediately behind the locomotive. The covered 'sheds' over the pit head gear were to prevent rain water entering the mine and dissolving the rock salt. [160]

Around 1880 Verdin's introduced rock cutting machinery into the Adelaide mine; an 'Air Engine and Rock Cutter' made by Messrs. Walker Brothers (Wigan) Ltd being installed. The amount of salt shipped from the Adelaide mine in the years 1884–

155 Salt Union 1908, 25, entry 90, CRO DIC/SU9/1
156 Horton 1993, 52
157 CRO LSW (not accessioned) Norman Eaton, oral history transcript, 1989.
158 Lynch 2004, 43.
159 Lynch 2004, 62.
160 CRO D6490, Salt Union photos

1886 was in the region of 12,500 tons (12,700 tonnes) a year.

As with many of the Marston Salt Works this operated as both a rock and white salt works. The land for the salt works on the surface was leased in 1869 [161] It developed rapidly in the following decade and was extensive by the time of the 1877 Ordnance Survey map. When it was sold to the Salt Union in 1888 it consisted of the following:

47 salt pans, 2 brine shafts, 2 pumping engines and pump trees, 3 houses, 1 office, 1 storeroom, 1 sailmakers room, 7 boilers, 3 large salt warehouses, 2 salt elevators, 2 smithies containing 17 hearths, 1 fitter's room, 1 water reservoir, 1 wheelwright's shop, 1 saw mill shed and pit, large wagon shops, 1 pair of winding engines for the rock mine, 1 rock salt mine and 1 locomotive shed.

5.14: Adelaide Works, Marston, facing north, the common pans are lined up either side of pitched roof storehouses, with the chimneys between. On the right hand side is the remains of the rock salt mine buildings. [162]

As such, it was the largest salt works in the Marston and Wincham district at the time and appeared to be fully integrated. Ten years later it continued to be one of the most productive works for the Salt Union, although the number of open pans had almost halved. The Salt Union report of 1908 [163] lists the following:

Lands, salt works etc. including 47 pans, 2 brine shafts with engines and pumps, 3 salt warehouses, dock yard, rock salt mine, with crushing mill and engines, 2 private canals, 3 houses etc. Of the 47 pans 23 have been dismantled. The remainder are in fair working order. One brine shaft known as the 'Old Helen' is of no use, the brine having left the shaft. The second shaft known as the 'Alexandra' is a working shaft and is in fair order. 2 of the houses are in good order, the 3rd is untenable. One warehouse has been dismantled with the pans referred to above. 2 warehouses are in good order and have a capacity of about 10,500 tons. The 2 canal branches are both in use. The rock mine is the only working mine in the Cheshire district and is in excellent order. A new rock mill was erected here 3 years ago.

5.15: The Adelaide Works in 1928. A bank of common pans (on the right), with attached store houses (on the left) and rows of chimneys. This was typical of larger works. [164]

The mine worked until 11th March 1928, when it was flooded when water entered via one of the shafts (see post-industrial landscape below). The buildings were dismantled and the machinery saved as the ground sank and a new 'flash' formed. The loss of the Adelaide, abandoned in March 1928, was a blow to the Salt Union, as it was their last remaining source of rock salt. To replace it they reopened a closed mine at Meadowbank in Winsford, the source of today's rock salt.

Archaeological survey and excavation was conducted in 1993. Between the canal and the Adelaide Flash were the remains of massive rectangular foundation built from stone, brick and concrete, with a number of associated concrete structures clustered around them. Some of the concrete structures survived to a height of over 2m. These were associated with the location of the shaft for the mine (5.16). The line of an infilled

161 Horton 1993, 52
162 Calvert 1915, 722
163 Salt Union 1908, 24, CRO DIC/SU9/1

164 CRO DIC-X-13, Salt Union Photos

canal arm was visible as waterlogged ground towards the south and the canal.

5.16: The pit head of the shaft to the rock salt mine is marked by a series of concrete blocks and protected by steel railings, these are located south-west of the Adelaide Flash.

5.17: The remains of brickwork can be seen sloping into the Adelaide Flash on its southern edge. Elsewhere the remains of the salt works survive as earthworks.

To the north-east of these remains were further remains of low linear earthworks and more structural remains although these were much smaller in scale. To the east of these remains and within open grassland were major rectangular earthworks within which were a number of parallel low walls (5.17). Only one substantial brick wall was visible on site. [165] Two trial trenches were excavated in the area.

The site is currently occupied by a local angling society. The remains of the buildings around the mine shaft are still visible. The earthworks between the Adelaide Flash and the canal are still visible on the ground today.

165 Horton 1993, 59

Ollershaw Lane Salt Works

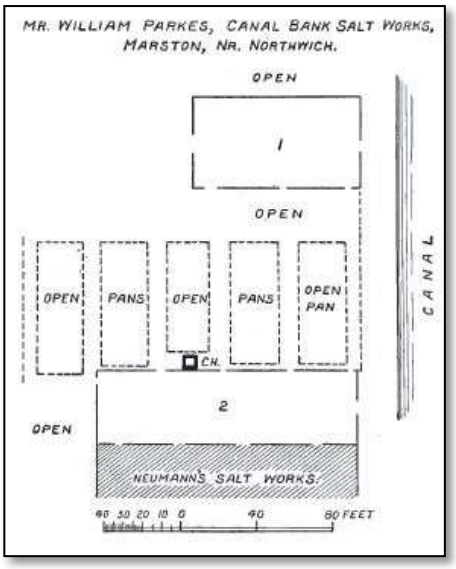
The Ollershaw Lane Salt Works (also called the Brookdale Works) was situated immediately north of the Lion Salt Works on the opposite side of the canal.

It was originally begun as early as the 1830s when it was known as Newman's Works and first denoted on Bryant's Map of 1831 (5.18). It is not clear if these were part of a 'white salt' works, a mine or merely store houses associated with the Charles W Newman's mine at the southern end of Marston (which later flooded and formed Neumann's Flash).

5.18: Marston and Wincham Townships, Bryant's Map of 1831.

The tithe map of 2nd July 1846 is no clearer. It depicts several buildings and these are noted as store houses for Charles W Newman. The adjacent coal wharf was occupied by Samuel Wright. Of these the western wharf. It was part of the Marston Coal Wharf that dates back to the 18th century.

By the 1870s the adjacent plot to the east, appears to have also been developed. This was called the Canal Bank Salt Works and was owned by Mr William Parkes. It is depicted on a plan, reproduced by Calvert (see 5.19) with five open pans and two store houses. Neumann's (note the change in spelling) Works lay adjacent to the west.



5.19: Canal Bank Works, Marston, Sketch Plan by Thomas Ward, 1870-1880s. [166]

The two works became amalgamated into the Ollershaw Lane Works. This is depicted on both 1st edition and 2nd edition Ordnance Survey Map (1877 and 1898 respectively). The works was served by both the Marston Branch of the railway and the canal, with two canal arms visible on the Cheshire Lines Survey map of 1893.

The inventory of property from 1908 suggests two salt works bought by the Salt Union in 1888. These were J H Padgett's Brookdale Works and William Parks' Ollershaw Lane Works. In total the lot contained lands with brine shaft, engine etc. Salt works containing 23 pans, 3 storehouses, workshops, graving dock (for servicing the narrow boats), 10 cottages, stable and coach house, manager's house etc. This suggests that the work was initially amalgamated from the two companies that existed side by side. J H Padgett's Brookdale Works was probably the earlier Newmann's Works on the west side of the site. [167] William Parkes, Ollershaw Lane Works was sold to the Salt Union on the 28th August 1888 for £2, 100 it had 15 salt pans, a house and a dock.

Less than 20 years later it was redundant. The 1908 Salt Union inventory of properties suggests that: *The whole of the works have been demolished except a few old buildings. The manager's house was converted into two cottages, making 12 cottages in all. This is a very poor class of property, 8 of the cottages being back to back houses.* [168]

5.20: The surviving cottages on the site of the Ollershaw Lane Works (left hand side). The photo is taken after the flooding of the Adelaide Mine and at the start of the formation of the separate flashes.

5.21: The Ollershaw Lane Flash, with the Lion Salt Works in the background. Remains of the Ollershaw Lane salt works are visible as earthworks between the flash and the canal.

The inventory also lists a separate property on Ollershaw Lane acquired from J Verdin and Sons and part of the Ollershaw Lane Works. This was close to Neumann's Flash and represented the remains of Neumann's Mine. It had been converted to a brine shaft referred to as 'Albert Brine Shaft' and had pumping engine and pumps. It is likely that they were extracting 'bastard brine' from the mine and this was being sent to various salt works in the area. [169]

166 Calvert 1915, 700
167 Salt Union 1908, 25; entry 81, CRO DIC/SU9/1
168 Salt Union 1908, 25, entry 81, CRO DIC/SU9/1
169 The Albert Brine Shaft is referred to in the Albert Kinsey Thompson's diaries dating 1909-1937. This includes reference

The Adelaide Mine was extended in the first three decades of the 20th century under Ollershaw Lane and the land beneath the Ollershaw Lane salt works. When the mine collapsed a large flash was formed taking the roadway with it (5.20). The Ollershaw Lane was built up on a causeway, separating the two flashes that exist today. The Ollershaw Lane Flash is on the eastern side of the road (see 5.21).

The site was surveyed and trial excavations were conducted in 1993. These revealed that although the northern side of the site had been destroyed by the collapse of the Adelaide Mine and the subsequent formation of the Adelaide Flash, the former remains of earthworks were visible up to 2m in height although these survived mostly as rubble remains. Two canal arms were well preserved on site, with sandstone walls of one partially visible. [170]

The site is currently occupied by a local angling society. The remains appear to have deteriorated over the last twenty years. However, some earthwork remains are still visible on the southern side of the flash before the canal. This includes waterlogged ground in the location of two canal arms and upstanding earth mounds in the location of former buildings. The easternmost buildings are now covered by a small copse.

Royal Oak Salt Works

This was located either side of the canal, just east of the Marston/ Wincham township boundary. The southern half had 14 common pans, distributed evenly either side of a central wharf. Two buildings were situated adjacent to the Marston Branch of the Cheshire Lines Committee Railway, presumably salt stores. North of the canal were a further 14 common pans, these were distributed evenly around a short tramway from the Marston Branch, again with two salt stores serving the buildings. [171] All the buildings had been removed by 1910, [172] again as part of the Salt Union closures.

5.22: Royal Oak works is in the top right corner, above and below the canal. The Ollershaw Lane and Alliance works can also be seen. [173]

Today the southern half of the site, south of the canal is part of a static caravan and park homes site. The north of the canal is occupied by industrial units.

Wincham Salt Works

The Wincham Salt Works was a small to medium salt works distributed north of the canal either side of the bridge over the canal in three separate sites, two sites formed salt works, whilst the one in the middle was a Chemical Works. The works appears to have been an amalgamation of several small works.

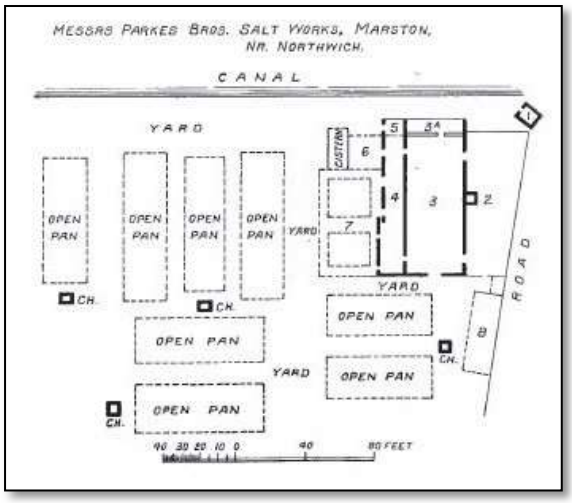
The one just east of the canal was known as the Messrs Parkes Brothers Salt Works, drawn by Thomas Ward in the 1870s and wrongly noted in Marston (5.23). This depicts eight open pans, two pan houses and two stove houses, with a brine cistern adjacent. By the time of the 1st edition Ordnance Survey map of 1877, this is referred to as the Wincham Salt Works (although the naming is somewhat confusing). This also shows the separate sites of the chemical works and salt works the other side of the canal.

It was sold as part of a lot referred to as the Wincham Estate on the 6th October 1888 to the Salt Union. It consisted of 12 pans, 3 stove rooms

to the Salt Union extracting brine and sending it to Weston Point, via the Marbury pipeline.
170 Horton 1993, 76
171 CRO NPR 4459-8

172 Ordnance Survey 25-inch map, 1910.
173 1892 CRO NPR 4459-8

and 4 storehouses. It was dismantled shortly after purchase and is recorded as such on the 1908 Inventory of Properties of the Salt Union. It is not depicted on the 2nd Edition Ordnance Survey map of 1898.



5.23: Parkes Bros, Salt Works, Marston, sketch by Thomas Ward, 1870s. [174]

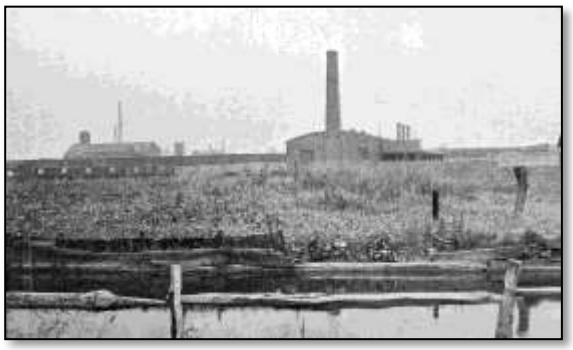
In 2014 the site was occupied by industrial factory units.

Wincham Patent Machinery Salt Works

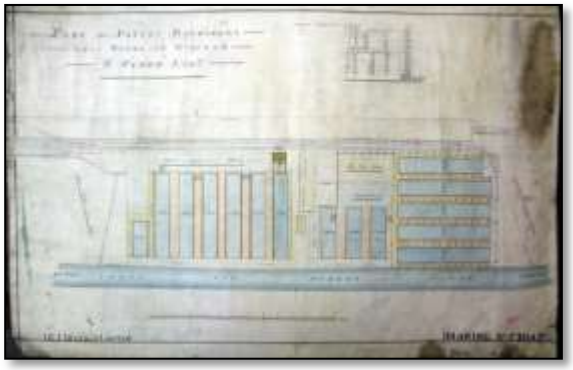
The Wincham Patent Machinery Salt Works was located between the Wincham Branch of the Northwich Salt Lines railway and the Trent and Mersey canal (5.24).

It consisted of ten pans, [175] which were later extended to 15 pans. Brine was pumped and stored in a cistern. It was first depicted on the 1st edition Ordnance Survey plan of 1877 as two large buildings, with no pans visible. A more detailed undated plan in the possession of the Salt Union (5.25) shows that these were in fact two covered banks of pans, akin to a set of Butter or Dairy pans, as well as two covered fine pans with an attached stove house.

All the buildings were sold to the Salt Union in 1888. They do not appear on the 2nd edition Ordnance Survey map of 1898 and were demolished as part of the rationalisation of the salt works. [176]



5.24: The remains of the Wincham Patent Machinery works are in the foreground with the long line of pans of the Bridgefield and Victoria Salt Works behind. [177]



5.25: An undated plan of the Wincham Patent machinery Works.. [178]

Bridgefield and Victoria salt works

This was a medium-sized works, probably opened in the 1860s. The site was originally split into two works, one of 18 pans in a line, north of the Wincham Branch of the Northwich Salt Lines railway and another of four banks of seven, seven, six and four, at the end of the line and also served by the canal. The works had become amalgamated into the Bridgefield and Victoria Works by the time of the 1st edition Ordnance Survey map of 1877.

There are no apparent salt stores, which would appear to indicate a series of common pans that delivered undried common salt in bulk. They would have been delivered directly into canal boats or railway wagons. The works had ceased

174 Calvert 1915, 702
175 CRO DIC/SU/4623/8.

176 Ordnance Survey 25-inch map, 1898.
177 Calvert 1915, 725
178 CRO DIC-SU-4623-8

and the buildings had been demolished by 1910. [179]

Originally, the Victoria Works was purchased by the Salt Union from J. Verdin and Son on the 6th October 1888. At the time it consisted of 41 pans, four warehouses, a brine shaft and office.

Twenty years later by the time of the Salt Union Inventory of Properties dated 1908, it was stated:

…of the 41 pans, 20 had been cut up and the material used up on the works. The remaining 21 pans were in good order. These works supply a large portion of the fishery salt required in Northwich. An additional warehouse was built in 1906. 2 of the 4 warehouses were dismantled when the 20 pans were cut up. Total warehouse capacity was 6,700 tons. The original brine shaft collapsed and was filled up and the pumping plant removed about 1900. Brine was then supplied from the Alexandra shaft, a timbered shaft. [180]

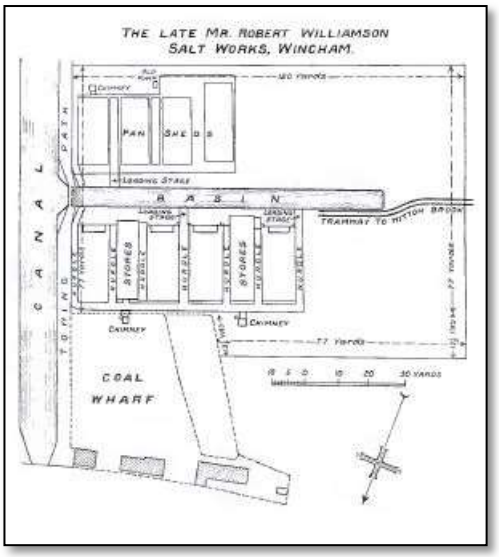
Transport to the works was via the canal, where a dry dock was situated, and the railway. The works were still intact in 1910. [181] The wharf timbers along the canal were still visible in 2014 and the site was occupied by Northwich Victoria's football ground.

Imperial Salt Works

This was another small late-19th-century salt works along the Trent and Mersey canal. It probably originally began in the late 1860s or 1870s. the earliest plan is possibly one made by Thomas Ward, reproduced in Calvert (5.26) that shows the layout of the works and describes it as the Late Mr Robert Williamson, Salt Works, Wincham. This corresponds identically to that depicted on the 1st edition Ordnance Survey map of 1877 as the Imperial Salt Works.

The earlier plan depicts eight open pans and two store houses around a canal basin, south of the canal. A tramway is depicted passing towards Witton Brook, suggesting that originally this was used to load salt directly onto Weaver Flats that had sailed up through the flashes that formed the Witton Brook (a similar tramway was used by John Thompson on his Platt's Hill Mine).

By 1877 10 common and 5 fine pans and was served by the canal with a dock and a railroad or tramway to Northwich. By 1898 it was closed, [182] probably a victim of the Salt Union closures, but the dock was still marked on 1910 map. [183]



5.26: Imperial (Robert Williamson) Salt Works, Wincham, Sketch Plan by Thomas Ward, 1870s. [184]

In 2014 the site was still unoccupied. Remains of the former salt pans were visible in undergrowth as a series of earthworks, although no access was possible to the site.

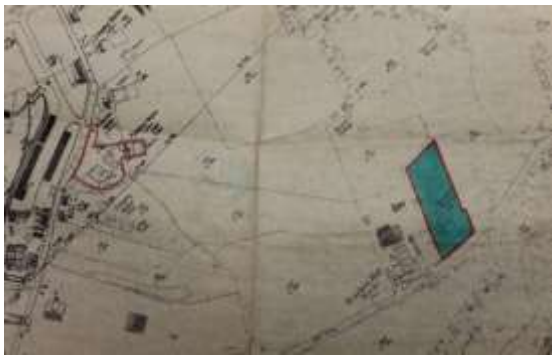
Wincham Hall salt works

The Wincham Hall Salt Works was one of three small salt works dating to the last few years of the 19th century, located in a row adjacent to the Trent and Mersey canal, south-east of Wincham. It was opened around 1895 under a lease from the Wincham Hall Estate. The works was run by Alfred Jabez Thompson, the brother of Henry Ingram Thompson from the late-19th century. It was not part of the Thompson family business, because the brothers had fallen out and they operated independently (5.27, 5.28).

179 Ordnance Survey 25-inch map, 1910.
180 Salt Union 1908, 22, entry 78
181 Ordnance Survey 25-inch map, 1910.

182 Ordnance Survey 25-inch map, 1898.
183 Ordnance Survey 25-inch map, 1910.
184 Calvert 1915, 696

5.27: Wincham Hall Works, Sunbeam Works and Woodside Works marked on the 1910, 3rd edition Ordnance Survey map.



5.28 The Wincham Hall Works is depicted on Ordnance Survey maps of the 1950s along with the adjacent Sunbeam Works. The Woodside Works had closed by this time.

5.29: The Wincham Hall Works facing east. A branch from the canal went under the lean to roof to allow loading of salt to take place under cover. [185]

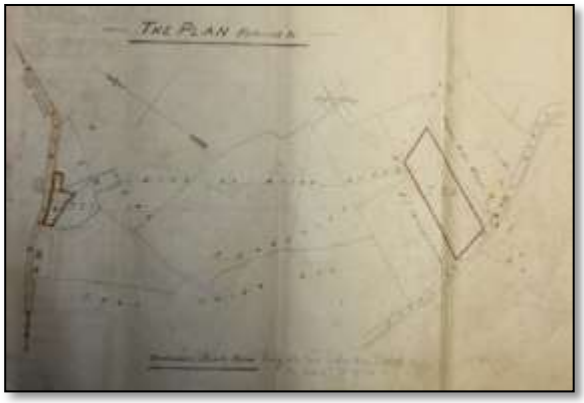
In 1898 it had two banks of five pans and two pans, set around its own canal wharf. [186] By 1910, the works has only four pans around the canal wharf. The other pans have been converted to an undercover loading dock, which probably doubled as a salt store. [187] The absence of stove houses suggests that the Wincham Hall works was operating common pans, producing common salt, subsequently stored and delivered down the canal (5.29).

The canal wharf was still visible in 2014 and the old loading dock continued to be used as a winding point to turn narrow boats (5.30).

5.30: The canal loading dock of the Wincham Salt Works in 2014

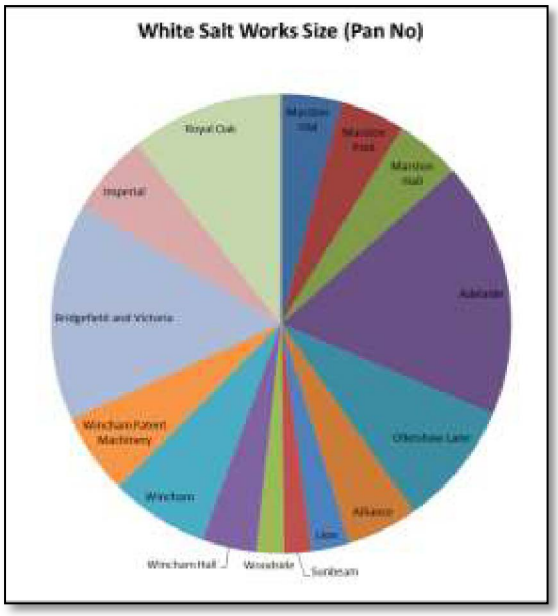
Sunbeam salt works

The adjacent plot was the Sunbeam Works, a separate site leased by the Thompson's and operated in conjunction with the Lion Salt Works from 1897. It is discussed in greater detail below.



5.31: Plan of the land plots of the Sunbeam Works lease dated 1912, with brine shaft location and pipe. Adjacent plots are marked A J Thompsons Works lease and Raynor & Cos Lease.

185 Calvert 1915, 724
186 Ordnance Survey 25-inch map, 1898.
187 Ordnance Survey 25-inch map, 1910.



5.32: The pie chart above compares the salt works in Marston and Wincham by pan size. The much larger Bridgefield and Victoria, and Adelaide Works had over 40 pans when they were bought by the Salt Union in 1888. The works that grew up in competition to the Salt Union in the early 20th century were very small including the Lion, Sunbeam, Woodside and Wincham Hall Works, typically with only five pans.

Woodside salt works

The Woodside salt works was the third of the three salt works in this location. It was one of three works on land outside the limits of the Salt Union mineral rights. It contained five common pans around a canal wharf. [188] It lay adjacent to the Thompson's Sunbeam Works site (see below). The works were run by Raynor and Co. as shown on plan of the Thompsons' lease on the Sunbeam Works (5.31). [189] The works had fallen out of use by the 1950s and there is no trace of their remains on the ground in 2014.

The Post-Industrial Saltscape – The Effect of Subsidence

The salt districts are by no means picturesque. The volumes of smoke emitted by the chimneys, of which there are a great number, and the steam which is driven off the brine, make the works and their neighbourhood anything but pleasant spots. The smoke in the prevailing line has a very injurious influence on the vegetation, and some of the land near the works may be described as a 'waste howling wilderness'. The subsidences of land caused by the pumping of the brine do not make the district either more beautiful to look at or safer to dwell in. [190]

This is how the salt-district was described in the 1880s. As much as the story of salt in Cheshire is one of production, it is also one of devastating destruction caused by ground subsidence.

It was the industrialised production of salt in the 18th and 19th centuries that caused widespread subsidence. The subsidence in Northwich and Winsford, and the subsequent compensation bills, were discussed at length by A K F Calvert. [191] Dramatic subsidence was still occurring at the time of Calvert's writing and the landscape around Marston continued to be dominated by the dramatic flashes that resulted. The following is a summary of the 18th- and 19th-century subsidence as described by Calvert, updated with reference to more recent subsidence events and the subsequent landscaping that has dramatically altered the landscape.

The causes of subsidence

Ground subsidence was first noted in the salt districts of Northwich as early as the medieval period as a result of the natural dissolving of the salt layer. However, by the 18th and 19th century dramatic subsidence was occurring due to man-made causes: salt mining and brine extraction.

Collapse of Top Rock Pits

The first evidence of subsidence occurred as early as the 1750s. These were dramatic funnel-shaped collapses where the roofs of top rock pits fell in. Initially concentrated around Northwich, The first of these occurred in 1750 when the Old Rock Pit fell in near Leicester Street and Witton Street. Throughout the late-18th century a series of top rock pit collapses occurred along the line of the Witton Brook towards Wincham and Marston. In part, these can be explained by the unregulated

188 Ordnance Survey 25-inch map, 1898.
189 CRO D8645 LSW 90/412/70.

190 *The Daily Graphic*, 6 March 1890.
191 Calvert 1915, 304-385.

mining of the top rock pits, where insufficient support would be left for the roof. The brine stream, known as 'Roaring Meg' would dissolve what little support remained. The discovery of the lower bed meant mining had all but ceased in the upper bed by the early 19th century and although old top rock pits continued to collapse they were less frequent. [192]

Gradual subsidence caused by the dissolving of the top bed

Gradual subsidence occurred when the top bed of salt was slowly dissolved over time by the continual pumping of brine. The upper and lower layers of rock salt were separated by layers of marl, with the brine streams running over the top rock salt bed. As the brine stream dissolved the rock salt it left cavities. As mentioned above this was a natural process, but the industrialised production of salt meant that a far greater quantity of salt was dissolved from the ground than came to the surface.

Rapid subsidence caused by the collapse of bottom bed mines

From the 1780s and 1790s the bottom bed of salt began to be mined almost exclusively. Better understanding of the mining process by this time meant that the mines did not tend to collapse during their working life. Pillars of salt were left in place at frequent intervals that helped support the roof of the mine.

However, it was once they ceased working that the mines became problematic. Sometimes the water broke through into the mine workings. Once water flooded a mine it became a vast reservoir of brine. From the 1840s and 1850s it became common practice to pump this brine to the surface to produce salt. Increasingly during the boom years of the 1860s, 1870s and 1880s the mines were deliberately flooded. The continual process of reducing and increasing the salinity and level of brine in the mines caused the pillars to dissolve. As the pillars dissolved the ceiling of the mine became unsupported and collapses were sudden and catastrophic, particularly in the area between Northwich and Marston. This resulted in the sudden appearance on the surface of a large hole. The air displaced as water rushed into the hole would find its way to the surface some distance away, causing the surface of another pool to bubble and boil and geysers of water and mud to be thrown some distance into the air.

The formation of flashes

The subsidence led to what Calvert refers to as 'trough-shaped hollows' that could range in depth from very deep troughs with stepped or terraced sides, to shallow almost imperceptible hollows. [193] The bases of these hollows lay below the ground-water level and formed lakes known as 'flashes' (see 5.33 and 5.39, below). Where they formed adjacent to the River Weaver or one of its tributary streams they became continuous flashes of great size. South of Winsford, the Upper and Lower Flashes covered almost 100 acres (40ha.) and those between Marston and Northwich were some of the most dramatic.

5.33: The Lion Salt Works looking across the Ollershaw Lane Flash, facing south, winter 2013.

Subsidence of this type began in the late-18th century from 1780–1790 and increased dramatically throughout the 19th century, reaching its zenith in the 1880s and 1890s. The subsidence can be seen to directly correlate with the increase in salt production in Northwich. To put this in context, Brunner Mond and Co. calculated that the amount of brine they pumped in the ten years to 1905 would have dissolved the equivalent of 75 acres (30 ha.) of salt 14 feet (4.3m) thick between Marston and Northwich, with the brine pumped by

192 Calvert 1915, 304–306.

193 Calvert 1915, 304.

the Salt Union dissolving another 10 feet (3m) thick over the same area.

In 1872, conditions became so bad that Mr Joseph Dickinson, Her Majesty's Inspectors of Mines, visited Cheshire and investigated the subsidence. His report was presented to the House of Commons in May 1873, and as a result 'The Cheshire Salt Districts Compensation Bill' was lodged with Parliament in December 1880. [194] However, subsidence continued throughout the 1880s. Thomas Ward exclaimed in 1881:

'The area of the mischief is extending yearly, and a larger proportion of property is becoming affected, and more and more land is sinking beneath the water and increasing the area of the already existing extensive lakes. Very few, except those conversant with the district, have the slightest knowledge of the amount of suffering caused to property owners by this subsiding of the land'. [195]

The Northwich Subsidence

Throughout the 19th century gradual sinking of the land occurred in Northwich town centre, along the banks of the River Weaver, around Witton Street and the High Street, in the area around the Warrington Road and Mill Street and in the Dunkirk district. Subsidence was first noted in the Northwich town centre and its suburbs in 1819 by Ormerod. [196]

The sinkings in and around Northwich have rapidly extended [since 1870]. Speaking of Northwich itself, all the town from the Weaver Bridge to Dr Wolseley's (late Williams') surgery is sinking fast, and a deep hollow near the Old Lamporne Brook or Ditch formed. All the property is seriously shaken, and the Congregational Chapel built in 1853 has had to be taken down (1881), having sunk most rapidly since 1870. The town of Northwich, along the banks of the Weaver, sinks badly, and at the junction of High St. and Witton St., nearly the whole of the property has been taken down and rebuilt, and the street raised many feet.

194 Calvert 1915, 324–325.
195 Calvert 1915, 325–326.
196 Calvert 1915, 306.

In the centre of Northwich subsidence was due to brine pumping from the top bed of rock salt. Within the town centre, there were no mines, so many of the sudden collapses were due to the sinking of the ground over an underground brine stream (e.g. 5.34).

5.34: Here the Castle Chambers on the western bank of the River Weaver have subsided into remains of a former top bed mine. [197]

Towards the end of the 19th century new buildings in Northwich were constructed with a timber frame to allow for subsidence. Buildings built in this way could be jacked up level and packed up if the ground beneath the building sank. Brick buildings were left behind as the level of the road was raised to combat flooding from the River Weaver. Known as the 'Big Lift', in the 1920s a substantial part of the town was raised up from its former level. [198]

Subsidence between Northwich, Marston and Wincham

The area between Marston, Wincham and Northwich town centre saw some of the most dramatic subsidence in the Cheshire salt fields. Three large 'flashes' formed as the mines in this area subsided; these were Ashton's and Neumann's Flash and adjoining them another flash, formed by the Witton Brook. By the end of the 19th century they covered an area of over 160 acres (65 ha.).

197 Calvert 1915, 1161
198 Wood 1981; Fielding, A P pers comm, paper given at the Association of Industrial Archaeology Conference, 6th September 2014, Recreating the Salt Town of Northwich and its Victorian Buildings

The Witton Brook

The area between Marston, Wincham and the Northwich town centre began to subside from the 1790s. The first noted area was along the line of the Witton Brook, which had long been a location of salt works, including top bed mines and open pan salt works. These lined either side of the brook where its course cut through the landscape to the salt beds below.

Witton Brook had been made navigable and a canal put in place to serve the salt works in Marston from the 1790s. By 1811, the lock and weir that served the canal had been removed because the ground had subsided and the surrounding land had flooded. The area around the brook continued to subside so that by 1837 it formed a lagoon some 1230 yards (1125m) long by 150 yards (137m) wide and by 1842 covered some 20 acres (8ha.). [199]

Ashton's Flash: The Dunkirk Area and the major collapse of 1880

The Witton Brook continued to the east where it entered the area known as Dunkirk, which had been subjected to extensive salt-working since the 18th century (see 5.35). Initially, a series of top rock salt mines was sunk, many of which collapsed. It was later one of the most extensive areas of bottom bed rock mining with a number of major mines in the area. By the 1840s and 1850s these became the centre of 'bastard brine' extraction. Many of the mines were linked together to form multiple systems with vast reservoirs of brine. The brine was pumped from these systems and collapses began to occur.

The most dramatic of these occurred at Platt's Hill mine taking with it the remains of the Ashton's salt works. The flooding of the Platt's Hill mine in 1880 led to the gradual subsidence of the ground on which stood Ashton's salt works. A crack in the ground opened up across the Wade brook, which started to pour into the mine workings through the crack. As the water scoured out the hole the rush of water increased, the waters of the Witton brook, the river Weaver and the flashes roaring into the chasm. The workmen saved as much of the salt works as they could, but as the water dissolved the rock salt and the land sank the chimneys fell and the buildings sank beneath the water. It was estimated that some 800,000 tons (812,837 tonnes) of water and earth were swallowed up before the disturbance ran its course.

5.35: Subsidence of the Dunkirk area near Northwich [200]

Neumann's Flash

Initially, gradual subsidence caused small depressions and flashes to appear. Rapid subsidence began to occur in the Marston District from the 1870s. Very serious, sudden subsidence also occurred between Marston and Newbridge. One large subsidence, some 8 acres (3.2ha.) in extent, was called 'The Ocean'. [201] Another, known as 'Marston Old Hole', was caused by the sudden collapse of Neumann's Mine, a consequence of the dissolving of the rock salt as brine was pumped from the flooded mine workings (5.36). The water from a small brook fed the hole to form a flash, seven or eight acres (3.2ha.) in extent. The lake periodically drained as water flowed into the mine workings below. [202] These two features appear to have joined together to create Neumann's Flash that still exists today (5.37). By 1877, subsidence had caused the Marston Road (Ollershaw Lane) to sink 30 feet (9m). The road was initially diverted to the east to run round the flash.

199 Calvert 1915, 304–307.

200 Calvert 1915, 371
201 Didsbury 1977, 140; Calvert 1915, 326.
202 Calvert 1915, 333.

5.36: Subsidence of land south of Marston, known as Marston Old Hole. [203]

5.37: Looking south-west towards Neumann's Flash visible across the roof tops of Marston. The subsidence caused by collapsing mines continues to surround the village in the early 21st century. [204]

20th-Century Collapses of the Mines in Marston

Water began to enter the Marston Hall Mine in 1905. The mine was abandoned and fresh water started to dissolve the supporting pillars. The movement of the ground above in turn cracked the culvert taking the Forge Brook under the canal. The flowing waters undermined the canal bed, and on the morning of the 21st July 1907 a whirlpool was seen in the canal. Within a few minutes the rush of water had scoured a gaping chasm 60 feet (18m) across and 30 feet (9m) deep. Boats were left stranded on the bottom of the canal as the water ran away, some of the boatmen having been treated to the spectacle of their boats rapidly overtaking the horses towing them. Boatmen who had already passed the site of the breach had to spur their horses on to overcome the strong current of water.

Despite the damage, with 200 men barrowing clay the canal was re-opened on 4th August 1907, work being hampered by the large number of bystanders. During the repairs, canal traffic was at a standstill and hundreds of boats and their crews were out of work. One of the two work boats was recovered, but the other one was buried where it lay (see 5.7 above).

The flashes north of the Lion Salt Works were caused by the collapse of the Adelaide Mine. Water entered via one of the shafts 11th March 1928 and the leak could not be stemmed. The fresh water running into the mine dissolved the supporting pillars, and the ground above slowly sank. Now a lake used for fishing, there is no sign that a salt works ever stood on the site (5.20, 5.33 above).

The Modern Landscape: Filling in the holes

The filling in of the holes caused by subsidence was not new and continued throughout the 19th century. The clinker residue, along with ashes from the salt works produced by the open-pan fires was dumped in great mounds and was known as 'cinder mounds'. [205] Cinders were put to every sort of use to get rid of them and a special class of boat, 'cinder boats' carried them to be dumped in the flashes. [206] The flashes proved to be a handy place to dump dredgings from the river Weaver, some 150,000 tons (152,407 tonnes) a year being tipped in the late 1800s. Brunner Mond also needed space to tip the waste from their chemical works, which was transported by overhead ropeway and also tipped into the flashes. Spoil was even brought from Liverpool docks to try to fill the ever increasing holes.

[203] Calvert 1915, 381.
204 Picture courtesy of Edward Roberts

205 Didsbury 1977, 142.
206 Didsbury 1977, 142.

5.39: Extent of the Northwich Flashes – The area between Marston, Wincham and Northwich town centre saw some of the most dramatic subsidence in the Cheshire salt fields. Three large 'flashes' formed as the mines in this area subsided; these were Ashton's and Neumann's Flash and adjoining them another flash, formed by the Witton Brook. By the end of the 19th century they covered an area of over 160 acres (65 ha.).

By the mid-20th century there was concern about chemicals getting into local water courses, so bund walls were built around the main tipping areas and the streams re-routed around the outside. Once the land was above water level bund walls were constructed to contain the waste and tipping continued until the land was well above water level. The majority of the land between Anderton, Northwich and Marston is reclaimed.

The mines adjacent to Northwich town centre have been filled in over the past 20 years to allow development to extend to the north. Baron's Quay mine, Witton Bank mine, Neumann's and Stubbs mine (Northwich; also known as Thompson's Mill Street mine) and Penny's Lane mine have been filled in using a saturated saline grout mix to prevent further subsidence. [207]

5.1: The land resulting from subsidence was filled during the 1950s and 1960s. It was landscaped to produce a seemingly natural environment known as the Northwich Woodlands. The Witton Brook, formerly the largest expanse of open water is now an enclosed brook with reed beds either side. The surrounding land has all been reclaimed.

207 Brooks *et al* 2006.

6. SALT PEOPLE

The Thompson Family

Much of the original research into the Thompson Family was based on work originally undertaken by the Thompson family, presumably Henry Lloyd Thompson or Jonathan Thompson. This produced a detailed chronological family tree of the Thompson's Family dating back to the 19th century (6.1). [208] This may have been supplemented by research by Andrew Fielding but no detailed referencing of the sources for this information occurred at the time of compilation.

More recent research has traced the Thompson family of Witton-cum-Twambrooks, a township of Great Budworth parish, now part of Northwich, back to the early 18th century in the person of a John Thompson, farmer, of unknown parentage, who died in 1793 at the age of 83. [209] Indeed, John was the name given to the eldest son of at least six generations of Thompsons, although the 19th- and 20th-century Thompsons who are associated with the salt industry were descended from a younger son, Henry (1776–1804). The Thompson family tree indicates that this Henry married an Elizabeth Ingram of Kendal, and it is believed that it is for this reason that many of the later Thompsons were given Ingram as a second name. [210] Henry Thompson and his wife Elizabeth were living in Witton-cum-Twambrooks in 1799, when their eldest son, John, was born. They were tenants of Sir John Leicester from 1800 to 1804, occupying first a house, then houses and land,[211] but Henry Thompson died of consumption on 9th August 1804 at the age of 28, when his son John was only five.

The origins of the Thompson's family involvement in the salt trade remain somewhat unclear. Speaking in 1988, Henry Thompson described the business as he remembered it from its earliest days in the 18th century, and claimed: '*…The family first started making salt in Cheshire, back in 1725. That was in those days, rock salt mines…*' [212] It is difficult to corroborate the earliest generations of the Thompson family. However, there are five specific generations of the family who are directly involved in the story of the Alliance and Lion Salt Works, which involves twelve individuals and their wives. There are other individuals who are linked with the wider story of the family and the story of Northwich.

Henry Thompson's son, John (John Thompson Senior, 1799–1867) is the first member of this branch of the Thompson family who can be linked definitively with the salt trade, although it appears that initially he, like his father Henry and his uncle, John, was a joiner. [213] John Thompson married Mary Fowles (1799–1879) of Witton-cum-Twambrooks on the 25th December 1821. Their ten children included John Thompson, their second child and Jabez Thompson their ninth child.

208 CRO D8645 LSW Original Family Tree of the Thompson Family now lost, photocopies of the family tree, with Ingram Thompson and Sons stamp, dated to 3 February 1982.

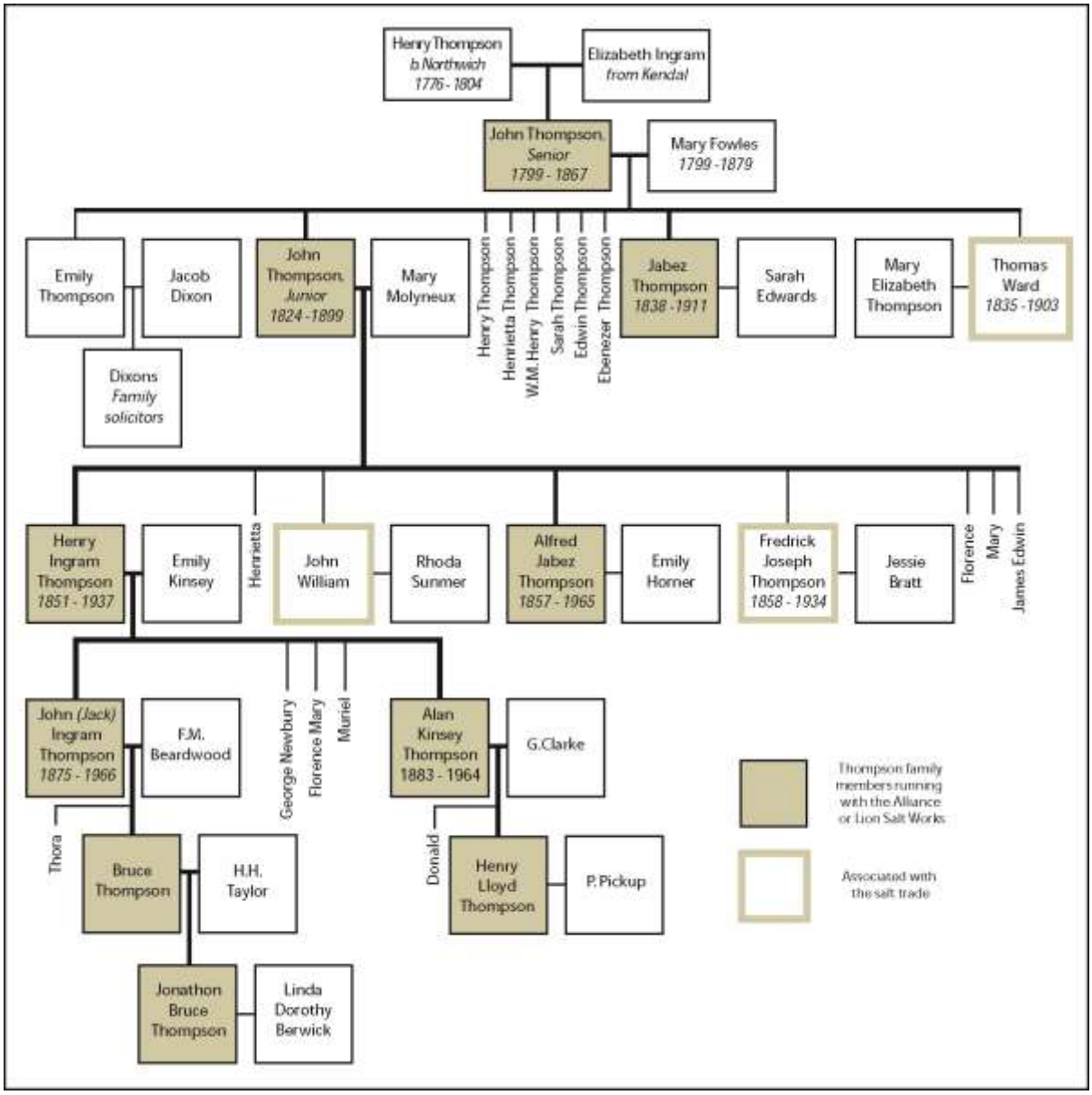
209 His son, another John, a gardener, had died in 1791 of consumption at the age of 47, and his grandson, also John, a carpenter, died twelve days after his grandfather, also of consumption, at the age of 25 (CRO P53, Microfilm 55/10).

210 The only record to be traced of a Henry Thompson marrying an Elizabeth Ingram relates to a union of 1795 in Manchester Cathedral, at which date Henry would have been 19 years old. This would fit the chronology but both Henry and Elizabeth are described as being of the parish of Manchester (CRO EDC8, Microfilm 243.90).

211 CRO QDV Microfilm 208/86.

212 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

213 Henry Thompson is described as such in the parish register for Manchester at the time of his marriage to Elizabeth Ingram in 1795 and at the time of his death in 1804. His elder brother, John, was also described as a joiner at the time of his death in 1793. Henry Thompson's son John advertised himself as a joiner and timber merchant in Pigot and Co.'s *Directory* for 1828–1829.



6.1: The Thompson Family Tree – six generations of the Thompson's were associated with the salt industry, including ten individuals directly involved with the running the Alliance or Lion Salt Works.

In 1841 John Thompson Senior was described as a timber merchant, [214] in 1851 as a ship builder, [215] and in 1861 as a ship builder and salt proprietor.[216] He was the owner of a coal mine, a boat yard, [217] a brickyard, several rock salt mines and open pan salt works. His wide business interests included Pool Mine, in Marston, and Penny's Lane Mine and Witton Hall Mine, in Witton. The family also had Thompson's Salt Works in Witton, and Faulks No. 4 Shaft in Winsford. On moving up to Marston John Thompson established the Alliance Salt Works. He first established a brick works on Manchester Road, Northwich in 1824. [218]

On his death in 1867 the business became fragmented between his sons. His eldest son, John

214 Census returns for Witton-cum-Twambrooks, Great Budworth, 1841.

215 Census returns for Wittoin-cum-Twambrooks, Great Budworth, 1851.

216 Census returns for Witton-cum-Twambrooks, Great Budworth, 1861.

217 The shipyard was on a basin of the Weaver Navigation immediately east of what is now Navigation Road in Northwich. Thompson's timber yard adjoined it. The properties appear on the 1846 tithe map and apportionment for Northwich and Northwich Castle (CRO EDT 306/2).

218 Museum Display on Jabez Thompson's life, Weaver Hall Museum (formerly Salt Museum), compiled by Stephen Penny and Andrew Fielding

Thompson Junior, (1824–1899), took over part of the salt business, and continued to manage Pool Mine, Penny's Lane Mine, Witton Hall Mine, Thompson's Salt Works, Faulks No 4 Shaft, Winsford, and the Alliance Salt Works. He was the first owner of the Lion Salt Works and was responsible for establishing the works prior to his death. He married Mary Molineux of Witton-cum-Twambrooks and had eight children, including Henry Ingram Thompson who managed the Lion Salt Works, John William Thompson who ran the Liverpool Office and Alfred Jabez Thompson, who managed the Alfred Jabez Thompson Salt Works in Wincham (6.2).

6.2: The entire Thompson family had an outing on their newly built Weaver Flat the Nautilus in 1888. The picture shows Mr and Mrs H I Thompson, Mr and Mrs A J Thompson, Mr and Mrs F J Thompson, Mr Jabez Thompson, Mr H Bratt and Miss Bratt, Mr T Capper, Ms and Mrs Cram, Mr C Forrest, Mr E T Ward, Mr and Mrs Woodcock, Mr W Such and children. [219]

John Thompson Junior lived in the vicinity of Northwich for most of his life, latterly at Witton Hall, but in 1889, just after the family salt concerns had been sold to the Salt Union (see below) he bought Eddisbury Hall, near Macclesfield, [220] and in 1891 was living there in retirement (6.3). [221]

6.3: *c.* 1900. John Thompson Junior is second from left on the front row of this family photograph taken at Eddisbury Hall, Macclesfield in the late 1890s. It is taken on the occasion of a visit to England of James Edwin Thompson (the youngest son) from his post as surgeon at Galveston Hospital, Texas, USA. [222]

One of John Thompson Senior's other sons, Jabez Thompson (1838–1911), initially worked for a shipping firm in Liverpool before becoming involved with the management of the Alliance Works during the 1860s and 1870s (see above). However, his main business interest was brick and terracotta manufacturing, and he is listed in adverts of 1850 as being the proprietor of both the Alliance Salt Works and the Thompson Brick and Terracotta Works. On the death of his father in 1867 he took over running the sole running of the brickworks leaving his brothers to take on the salt making responsibilities. In 1874, Jabez Thompson was a brick and drainpipe manufacturer, white and rock salt proprietors (Ollershaw Lane), Coal Merchant (agent Chas Lambert). His home was at Winnington Hill and Wade Brook House.[223] There are many surviving buildings with Thompson bricks and the links between the brick and salt trade are of importance. These include the terracotta

219 Photo is taken from the Northwich Guardian report of 15th September 1888.

220 CRO DDX/62/32. This conveyance document shows that John Thompson was living at Witton Hall at the time.

221 Census returns for Macclesfield 1891; he is described as living on his own means.

222 Picture courtesy of Henry Lloyd Thompson

223 Morris and Co.'s *Directory* 1874.

frontage of the Brunner Library and Salt Museum in Northwich (1889), the extension to the Northwich Workhouse (1892, now the Weaver Hall Museum and Workhouse) and the Brunner Guildhall in Winsford (1899). The use of terracotta was widespread within the town giving decorative function to many otherwise unremarkable buildings. There are important artistic connections with John Ruskin and architect John Douglas. Jabez Thompson lived at Abbotsford in Cuddington, and was chair of the Parish Council 1895/1896. [224]

The final member of this generation involved with the salt trade was through marriage, the son-in-law of John Thompson Senior, Thomas Ward (1835–1903), who married the youngest daughter, Mary Thompson, in 1862, at Witton-cum-Twambrooks. He managed Thompson's Salt Works for ten years, working in their Liverpool Office, before managing the Ashton Salt Works. Eventually he became manager of the Salt Union. His work as an inspector for the Salt Union produced a collection of records of the salt trade in the late-19th century. These formed the basis of John Brunner's Salt Museum in 1899 and were used to write Albert Frederick Calvert's work on the salt industry.[225] In many ways he was the grand-father of salt history in Cheshire.

This generation of the family were involved in the Temperance Movement. At a Public Meeting at the Town Hall Chamber on the 14th September 1880 on the 'Sale of Intoxicating Liquor on a Sunday' John Thompson (Junior) seconded the motion. Other attendees were Jabez Thompson and Thomas Ward. [226]

John Thompson senior's first child, Elizabeth Thompson, married Jacob Dixon. The Dixons maintained a close relationship with the Thompson family, acting as solicitors for the firm until the 1960s. [227]

The first generation to be exclusively involved with the Lion Salt Works was that of Henry Ingram Thompson (1851–1937). Henry Ingram Thompson (6.4) worked with his father and brothers to construct the Lion Salt Works from 1894. Along with his brother Jonathan William Thompson (the second child, 1856–1933), who worked in the Liverpool Office, they managed the Lion Salt Works in the late 19th century. It is difficult to trace Jonathan William Thompson, but his involvement in the business appears to cease on the death of their father. The business was eventually registered as a limited liability company in the name of 'Ingram Thompson and Sons Ltd'. Henry Ingram Thompson lived at a house called Beechfield in Cuddington. [228]

6.4: A portrait of Henry Ingram Thompson. [229]

Alfred Jabez Thompson (1857–1965), the third son also stayed in the salt industry. After initially working for the Lion Salt Works, he appears to have fallen out with Henry Ingram Thompson. The inheritance of the estate appears to have caused resentment between the brothers (see below). He

224 Latham 1975, 44–45.
225 Calvert 1915.
226 *Northwich Guardian*, 14 September 1880.
227 E.g. CRO D8645 LSW Letter regarding search of Land Registry undertaken 12th June 1964 by Dixon, Stelfox and Cross on behalf of Ingram Thompson Ltd.

228 1911 Census returns; CRO LSW 90/412/125.
229 Photo courtesy of Henry Lloyd Thompson.

went on to work for the Salt Union before establishing his own works in Wincham called the Alfred Jabez Thompson's Salt Works.

6.5: Jack Thompson (left) and Alan Kinsey Thompson (right) with the Salt Manufacturers Golf Trophy at Sandiway Golf Club, Cheshire. The competition is still an annual fixture for salt manufacturers in Cheshire and is still held at Sandiway. [230]

6.6: The young Thompsons, the picture shows Henry Ingram Thompson's young family including Alan Kinsey Thompson (standing) and Jack Thompson (seated right). [231]

230 Photo courtesy of Henry Lloyd Thompson.
231 Picture courtesy of Thompson Family, West Cheshire Museums (not yet accessioned)

Frederick Joseph Thompson (1858–1934) the fourth son also diversified working for the Associated Soda Company in Preesall, Lancashire where he developed modern methods of solution mining of salt.

After the death of Henry Ingram Thompson, the business passed to his sons John Ingram Thompson, also known as Jack, (the eldest 1875–1966) and Alan Kinsey Thompson (the fifth child 1883–1964). They managed the business interests including the Lion Salt Works and Sunbeam Salt Works as a partnership. Jack Thompson managed the works in Marston, whilst his brother worked at the office in Liverpool. [232] Alan Kinsey Thompson, father of Henry Thompson lived at Croft House, Sandiway, Northwich (6.5, 6.6). [233]

The final generation of Thompsons began after the Second World War. Henry Lloyd Thompson, Alan Kinsey Thompson's son, served in the navy and came back to Northwich to work with his father (6.7, 6.8). Speaking in 1988 he describes his initial time at the salt works:

…I actually started to work at the salt works in March 1947 [at 22 years of age], having done my bit for the country. After I'd been home a couple of months, Father said it was time that I made my mind up and came to work with him, so I can't remember the exact date but it was sometime in March and I went down with him one morning and that's how it started and I continued to go down to work for the next forty years.

I'd been in the Navy for three and a half years and then I was at home for two months and then I started work. I didn't really know whether I was going to make salt for the rest of my life but I was already very, very, familiar with it and decided that I liked it and that's what I did. [234]

He was later joined by John Ingram Thompson's son, his cousin Bruce Thompson. Bruce Thompson worked at the Liverpool office at 3 Rumford Street as a Director. [235] Bruce's connection with the salt

232 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
233 Latham 1975, 60; CRO LSW 90/412/128.
234 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
235 CRO D8645 LSW 90/412/132.

works was short lived and he became a Stockbroker in Liverpool on the advice of his mother. [236]

6.7: The Thompson's at a family wedding in 1947, Henry Lloyd Thompson, (second left) just after returning from the navy, next to his father Alan Kinsey Thompson. [237]

6.8: Henry Lloyd Thompson, at the Lion Salt Works on a visit after retirement in the 1990s.

However, his son, and Henry Lloyd Thompson's second cousin, Jonathan Thompson, began work in 1966 (6.9). He described how his first job on site was to begin the foundations of Stove House 5. He went on to run the office in Liverpool until 1976 and the marketing aspects of the business. He moved to the Marston office and was instrumental in marketing the Lion Salt Works as a museum as well as a working business and formed the basis on which the current museum is established.

6.9: Jonathan and Henry Lloyd Thompson in the Manager's House in the 1970s. [238]

The 19th Century Business

The Thompson family had a complex business that was far larger than the Alliance and Lion Salt Works. It was an integrated family business, including several rock salt mines, open pan salt works, a brick works, a boat yard, and co-ownership of a colliery. It also included a carrying business along the River Weaver to the ports in Runcorn, Weston Point and Liverpool.

The 19th century business empire of the Thompsons (John Senior and Junior) was built up over 60 years from the early years in the 1820s when it was based on brickworks and timber dealing. Around 1842 John Thompson (Senior) established the Rock and White Salt Manufacturing and Shipping Business. He was joined shortly after by his eldest son. The business had diverse interests in both the Winsford and Marston salt fields and paralleled the success of the Cheshire Salt industry.

By the 1850s the business was being run in conjunction with Jabez Thompson, another son. His part in the business lasted until the 1870s when he began to concentrate on the brick and

236 Pers comm. Jonathan Thompson to Chris Hewitson, 15 January 2014.
237 Picture courtesy of Thompson Family, West Cheshire Museums (not yet accessioned)

238 Picture courtesy of Thompson Family, West Cheshire Museums (not yet accessioned)

tile manufacturing business on Manchester Road, Northwich. He was replaced by three sons of John Thompson (junior); Henry Ingram Thompson, John William Thompson and Alfred Jabez Thompson. In addition his son-in-law, Thomas Ward played an active role in the business.

In the 1860s as the rock mining business declined the Thompsons moved their interest to White Salt Manufacturing in both Winsford and Marston. The Alliance Salt Works was one small part of a much larger business empire. The decline in the market in the late 1880s led to the family interests being sold to the Salt Union.

The Salt Business

The earliest evidence for John Thompson senior's involvement in business comes from the 1820s. Pigot and Co.'s Directory for 1828–1829, is revealing for the absence of information relating John Thompson to the salt industry. [239] John Thompson is not mentioned in Winsford (under Middlewich at the time) or Northwich as a rock or white salt manufacturer, but a John Thompson, joiner and timber merchant, of London Road, Northwich, was probably the founder of the salt business. In the 1834 directory John Thompson, timber merchant and lath dealer, was located on Witton Street, [240] and John Thompson, timber merchant of Witton Street appears in the 1841 census.

The recollections of Henry Thompson about earlier connections with the salt industry appear to be a family 'myth' and the reality is that the business was started in 1842 as he later states, in Witton Street, as an extension of the timber merchants, possibly taking advantage of salt reserves located beneath their property. In 1846 John Thompson held a timber yard to the south of the properties fronting Witton Street, north east of the present Market Hall, and occupied a cottage at Dunkirk near Witton-cum-Twambrooks with (unspecified) works attached. It was probably here that the Dunkirk rock salt pit sunk by John Thompson in the 1840s was located. [241]

…when the rock salt mining ceased they moved from Witton area, up to Marston and the business was started in 1842 by my great, great grandfather. [242]

In 1850 Thompson and Co. were described as one of the principal proprietors of rock pits in the township of Wincham. [243] In 1864 they were registered in Morris and Co.'s *Directory* as John Thompson and Son, and were shipbuilders, timber dealers, and white and rock salt proprietors. [244] In the 1861 census John Thompson's occupation is given as salt proprietor and ship builder.[245] In 1874, John Thompson and Sons were shipbuilders, timber dealers, and white and rock salt proprietors, with offices at Witton Street and 31 Tower Buildings, Liverpool. [246]

6.10: Letterhead from the 1880s, the business was still named John Thompson & Son, despite the death of John Thompson senior in 1867. [247]

Although initially the business was associated with the interests in Winsford and Northwich, this had changed in the 19th century. By 1874, John Thompson and Sons, had registered offices at Witton Street in Northwich and 31 Tower Buildings, Liverpool. [248] The offices in Liverpool had

239 Pigot and Co.'s *National Commercial Directory* 1828–1829.
240 Lath is one of the methods used in timber-framed construction to infill panels before rendering with plaster.

241 Witton-cum-Twambrooks township tithe map and apportionment, 1846. See below for the Dunkirk pit.
242 CRO D8645 LSW (not accessioned) Henry Thompson, oral history transcript, 1988.
243 Bagshaw's *Directory* 1850.
244 Morris and Co.'s *Directory* 1864.
245 Census returns for Witton-cum-Twambrooks township, Great Budworth, 1861.
246 Morris and Co.'s *Directory* 1874.
247 Picture courtesy of Thompson Family, West Cheshire Museums (not yet accessioned)
248 Morris and Co.'s *Directory* 1874.

moved by the later 19th century to 22 Lord Street where John William Thompson was based. [249]

Shipping and Ship-Building Interests

The shipping and carrying side of the business appears to have begun in the mid-1840s. The earliest paperwork records the date of the shipping and lighting as 1842. [250] It went under a number of guises in its earliest years, often operating in small short-lived partnerships as Rock Salt carriers. These included Thompson and Reynolds (1844–1844), Thompson and Ellerkamp (1845–1846), and John Thompson and Co. (1845–1847). [251] The father and son connection began when John Thompson senior and John Thompson junior for 47 years (1843–1889) had their own company that shipped rock salt, and a parallel company Thompson and Son that shipped White Salt for 40 years (1850–1889). [252] John Thompson (junior) appears to have maintained the family business name after his father passed away in 1867. In 1873, Jabez Thompson operated a separate business that exported white salt for a number of years (1873–1880), [253] presumably in parallel with his ownership of the Alliance Salt Works.

There also appears to have been a connection with ship building in the latter half of the 19th century. At the time of the 1846 tithe apportionment John Thompson (Senior) occupied a timber yard and dockyard buildings in Northwich Castle, [254] in 1851 gave his occupation as ship builder, [255] and in 1863 a John Thompson (probably senior) was advertising himself as '*Rock and White Salt Proprietor, Ship Builder & Timber Merchant, Sawing by Steam for Hire, Coal, Bricks and Draining Tiles for sale*'. [256] The dockyards were sold to cover debts to W J Yardwood's in 1887 (6.11).

249 CRO D8645 LSW Letter: John Thompson to J W Fells, 6 Jan 1894.
250 Delivery Notes, various, dated 1905–1910, CRO D8645 LSW 90/229.
251 Calvert 1915, 682–694.
252 Calvert 1915, 694.
253 Calvert 1915, 682–694.
254 Castle Dockyard and Buildings, Plot 221, owned by C W Newman, dated 1841, ref http://maps.cheshire.gov.uk/tithemaps
255 Census returns for Witton-cum-Twambrooks 1851.
256 CRO D8645 LSW Receipt, Dr. to John Thompson, Dated 31 December 1863.

6.11: Castle Dockyard on the 1st Edition Ordnance Survey Map of 1881-1882; surveyed 1875. The dockyard was located along the western bank of the River Weaver, below the castle mound in Northwich. The loop upon which the dock yard was located had become redundant as the River Weaver had been straightened south of Northwich. The original course was fossilised as the remains of the basin adopted by the dockyard. The basin survives until the current day.

Northwich Salt Mines and Works

The earliest mines of the Thompson family appear to have been top bed mines. One, which was originally owned by John Thompson and later by J. Mort, was located in the Dunkirk Pit. [257] Another called Captain's Pit was located in Wincham. [258]

The Thompsons also appear to have owned at least one pit in 'John Thompson's Mine' Leicester Street/ Tivis Hill, and possibly another in 'Thompson's Pit' in the Ashton Limebeds. [259]

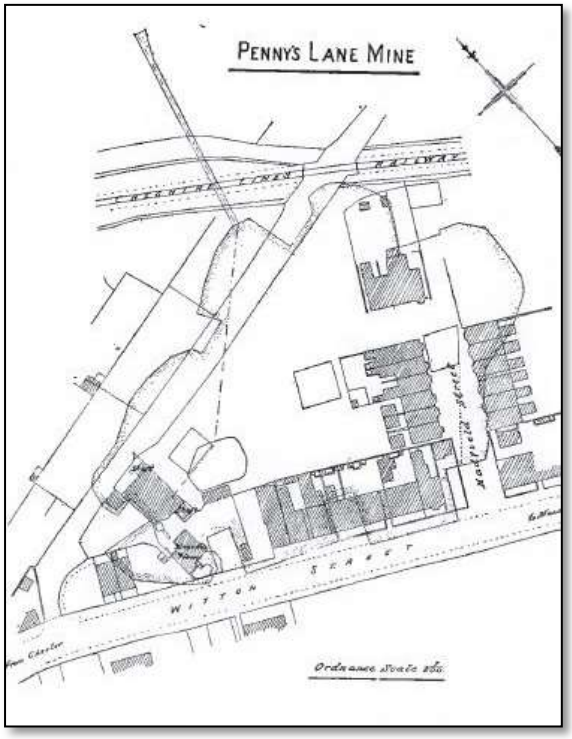
In the 1840s and 1850s the majority of mines were located in the bottom bed. One of the Thompsons' earlier mines, called Thompson's mine, was located in the Dunkirk Pit. [260] This mine became flooded, along with others, in the 1850s to form an underground reservoir of 60 acres (24ha.). [261]

257 Calvert 1915, 223, No. 23.
258 Calvert 1915, 223, No. 26A.
259 Lynch 2004, 49–50.
260 Calvert 1915, 223, No. 21B.
261 Calvert 1915, 158.

Platt's Hill Mine, Wincham, was sunk by John Thompson in 1843, [262] and was still open in 1872. [263] By December 1880 the collapses in the Dunkirk area had spread to the Platt's Hill Mine and it was flooded. [264]

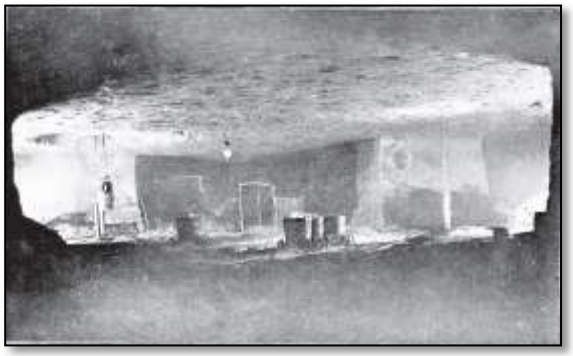
One of the other early bottom bed mines was located in Witton-cum-Twambrooks and was also called Thompson's Mine. [265] By 1873, it was closed and was being exploited for bastard brine by Cheshire Amalgamated Company (Limited) and Messrs Marshall. [266]

The other mine owned by the Thompsons in Witton was located in Mill Street. Originally, it was run by Neumann and Stubbs. It was still being worked in 1872. [267]



6.12: Plan of Penny's Lane Mine, Northwich [268]

Penny's Lane Mine on Station Road in Witton-cum-Twambrooks was originally owned by John Moore but was taken over by the Thompsons, who were operating it by 1872 (6.12, 6.13). [269] It was later sold to Brunner, Mond and Co. [270] The mine was three acres (1.2 ha.) in size with the bottom bed located at 312 feet (95m) below ground level. [271] It was still dry in 1915 when Calvert was writing. [272]



6.13: Interior Penny's Lane Mine. [273]

It was described in an extract from the Northwich Guardian, on Saturday 27th May, 1882;

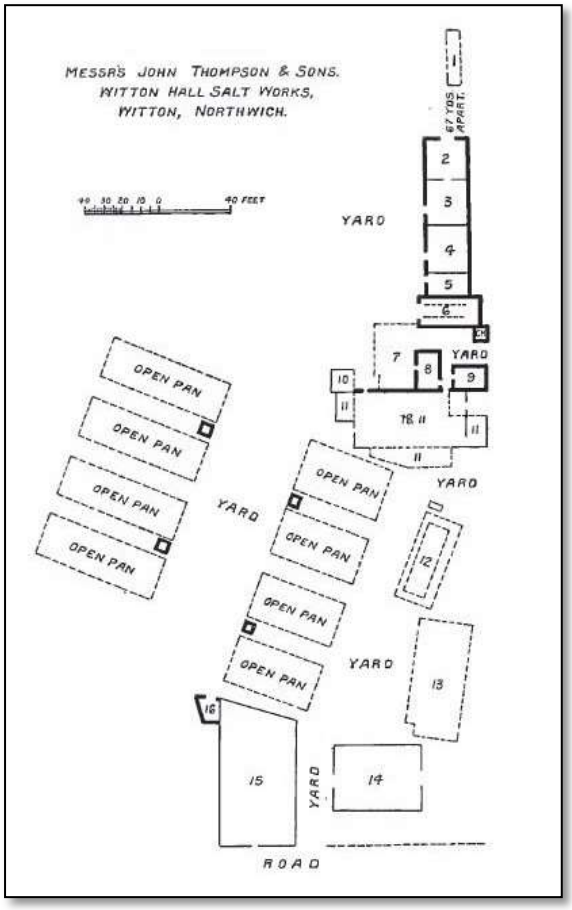
Salt Mine Illumination at Northwich: Messrs John Thompson and Sons Rock-Salt Mine adjoining Witton Street, not far from the Northwich Station; is to be illuminated during the whole of next week by means of Brush Electric Light, supplied by the Hammond Electric Company in Liverpool. There will be 16 lights the illuminating power which will be equivalent to 32,000 therm candles. A variety of amusements and refreshments will be provided in the mine, which will present an absolutely unique spectacle. [274]

The Witton Hall or Witton Bank Mine [275] was a medium-sized bottom bed mine, situated in Witton between the current Station Road roundabout to Leicester Street (6.14). It was over 13 acres (5.3ha.) in size and was opened between 1860 and 1868. It closed owing to faults in the shafts. These shafts were 330 feet (100m) deep. The first supporting pillars within the mines were 8 yards (7.3m) square, whilst the remaining pillars were built 10 yards (9m) by 8 yards (7.3m) and spaced at 25 yard (23m) intervals. [276] The mine was flooded after working ceased and John Thompson and Henry Ingram Thompson sold their

262 Schellhaas 1906, 49.
263 Calvert 1915, 277.
264 Calvert 1915, 223, No. 26.
265 Calvert 1915, 155.
266 Calvert 1915, 276.
267 Calvert 1915, 277.
268 Calvert 1915, 251
269 Calvert 1915, 277; Calvert 1915, 223, No. 9.
270 Calvert 1915, 155.
271 Calvert 1915, 268.
272 Calvert 1915, 158.
273 Calvert 1915, 253
274 Quoted in Lynch 2004, 34.
275 Calvert 1915, 223, No. 8.
276 Lynch 2004, 47.

lease rights to the Witton Hall Salt Mine (50 year lease @£550 per annum) and associated Witton Hall Salt Works (30 year lease @£320 per annum) in 1888. [277] It was sold on to Brunner Mond in 1908 and pumped dry. [278]

Although Henry Thompson suggests that the Thompson's ceased their mining exploits when they moved to Marston it was clear they still operated a number of small mines at this time. The Thompson Family had continuous interest in the Pool Mine, located just north-west of the Lion Salt Works. [279] It was being operated as John Thompson and Sons, in 1872. [280] It lay in the bottom bed and was 6 acres (2.40 ha.) in size, remaining dry until 1915. [281]



6.14: John Thompson's Witton Hall Salt Works, Witton, Northwich. [282]

The Crystal Mine, directly opposite the Lion Salt Works was operated by the Thompsons for a number of years. It was also known as Thompson's Crystal Mine. [283] It was a small mine of 3 acres (1.20 ha.) and was still dry in 1915.

The Thompson family's transition to operating open pan salt works appears to have been gradual with interests maintained in both trades for a number of years. It would appear possible that they first began to exploit brine by the process of bastard brine extraction. This is indicated by a number of pieces of evidence. They are first noted as exporting white salt in 1850. [284] This coincides with the first instances of bastard brine extraction in the Northwich area particularly around the Dunkirk Pit where the first mines became inundated. [285] The Thompson's were described in Morris and Co's *Directory* in 1864, as John Thompson, white and rock salt proprietors, Dunkirk Works (6.15). [286] It does not seem unreasonable to see them as also exploiting the brine reservoirs that formed in the connected mine system of the Dunkirk Area.

6.15: The Dunkirk Works on the 1st Edition Ordnance Survey Map of 1881-1882

The Thompsons' other mines at Platt's Hill and Witton-cum-Twambrooks also became flooded at a slightly later date, but it is not clear if these were also exploited for brine.

Winsford Salt Mines and Works

The mine and salt works at Meadowbank were owned by Herman Falk. They were sunk in 1844

277 Calvert 1915, 158.
278 Lynch 2004, 47.
279 Calvert 1915, 223, No. 1.
280 Calvert 1915, 277.
281 Calvert 1915, 158.
282 Calvert 1915, 697.

283 Calvert 1915, 255.
284 Calvert 1915, 694.
285 Calvert 1915, 213.
286 Morris and Co.'s *Directory* 1874.

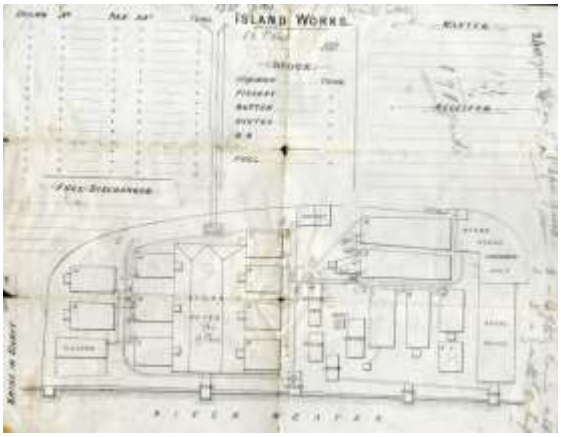
and were operated in 1851 by John Thompson. The Thompson tenancy ended in 1856 when Falk took over the management of the works himself. [287] This may have proved the emphasis for the expansion of the Thompsons' business in the late 1850s and 1860s.

The Thompsons had a number of open pan salt works operating in Winsford. In 1873 these included a borehole and salt works in the Over township, on the west side of the Weaver (6.16). [288] This was known as the Willow Bank Salt Works (also as Over Thompson's or Faulk's No 4). [289] John Thompson and Henry Ingram Thompson sold the Willow Bank Salt Works (lease expires 1904, @£95 per annum) to the Salt Union in 1888. [290]

6.16: The Thompson's had two salt works in Winsford. The Willow Bank Salt Works is described on the plan above as Messrs Thompson's Salt Works. [291]

On the opposite eastern bank of the Weaver, on the Wharton Side, they operated another open pan salt works called the Island Salt Works in 1873 (6.17). [292] Henry Ingram Thompson sold the Island Salt Works, Winsford (30 year lease £4,000) to the Salt Union in 1888. [293]

There is a possibility that the Thompsons also had an interest in a salt works in Lostock Gralam. Bowman, Thompson and Co, Lostock, had a borehole. [294] However, this was on the very edge of the salt fields where the salt deposits were shallower and consisted of a single bed of deeply buried salt.



6.17: Plan of the Island Works, taken from a stock control plan and order form. [295]

The 20th Century Business

The formation of the Salt Union in 1888 (see above) resulted in the purchase of many of salt works in the Cheshire region. As part of this amalgamation the Thompson family salt businesses were sold, a process organised by Thomas Ward, son-in-law to John Thompson.

The business that developed in the late-19th and 20th centuries was clearly very different. It was a small family business, operating as one of only two or three independent producers dwarfed by the much larger Salt Union that was later amalgamated into ICI Chemicals. Whereas the previous generation had operated several small businesses in unison run by different branches of the family, the early 20th century was divisive. Alfred Jabez Thompson and Henry Ingram Thompson were clearly separate producers and had little to do with each other.

The industry was exclusively based around white (open-pan) salt manufacturing. Rock-salt manufacturing by the 20th century was unviable and only a single mine was maintained by the Salt Union, at the adjacent Adelaide Works and after 1928 at Meadowbank in Winsford. Instead open-pan salt production was based at the Lion Salt Works, Marston and the Sunbeam Works,

287 Rochester n. d. (c).
288 Calvert 1915, 274.
289 Calvert 1915, 160, 261.
290 Calvert 1913.
291 CRO D8645 LSW Winsford Mineral Railway Extension Plan 1873,
292 Calvert 1915, 160, 261.
293 Calvert 1913.
294 Calvert 1915, 196.

295 CRO D8645 LSW Stock Control Plan of the Island Works,

Wincham. They continued to act as shipping agents for both their own salt and for others. This business is discussed in much greater detail below.

Phase 4, 1894–1899; Henry Ingram Thompson

As part of the deal John Thompson and Henry Ingram Thompson sold their lease rights to the Witton Hall Salt Mine (50 year lease @£550 per annum) and associated Witton Hall Salt Works (30 year lease @£320 per annum), the Island Salt Works, Winsford (30 year lease £4,000) and the Willow Bank Salt Works (lease expires 1904, @£95 per annum) to the Salt Union in 1888. This garnered them a combined total of £40,000 to John Thompson (Junior) and a total of £30,000 to Henry Ingram Thompson. [296] In addition, John Thompson's other son, Alfred Jabez Thompson sold his interest in the Alliance Salt Works for £17,000. [297]

Unfortunately, as many of the agreements set up with the Salt Union had been arranged quickly a series of disputes ensued. The Thompson family had a clear grievance with the Salt Union that was set down in a series of letters between John Thompson (Junior) and J M Fells of the Salt Union. [298] These begin in January of 1894 with a letter from John Thompson to J W Fells:

My son John William of Liverpool, has a matter to lay before you by my special request concerning my son Alfred Jabez from whom the Union purchased the Alliance Works, Marston in 1888.

He is desirous of being engaged as a Manager of Salt Works by and under the Union. The situation he holds merely as a Distributor is unworthy of him. He is certain and so am I that his services as a servant of the Salt Union would be of very great value to it. The salt he used to make had the very best name in the market. When he ceased to make it, he was obliged to cease to sell it. The Union or its agent could not or would not make it even at the same Works and finally destroyed the plant by which my son made it, and eventually incapacitated the Works.

…I am exceedingly desirous that both my sons, Henry Ingram and Alfred Jabez, should cultivate a feeling of complete harmony instead of hostility with the Salt Union. To do otherwise would give me great pain. This I have always advised. I know for a certainty that my sons (as well as myself) have been very badly used in time past by other former management in the Union, and your Secretary Mr Wickes can call to mind how bitterly I have protested against the bad usage.

J M Fells responded later that month, J M Fells to John Thompson, 30 January 1894:

I had the pleasure of an interview with Mr J W Thompson on the 17th instant, and with regards the question of the Alliance Works, I propose that we should purchase the freehold. I told Mr J W Thompson that I should be very glad if we could make some arrangement with both members of your family, namely Mr H I Thompson and Mr A J Thompson. Mr J W Thompson did not hold out much hope that he could assist us in obtaining an arrangement with Mr H I Thompson but he expressed a hope that we would be able to give Mr A J Thompson an appointment. I told him I would carefully consider the matter and speak to Mr Ward about it unofficially before it was brought up officially. I have, since I saw Mr J W Thompson, discussed the matter with Mr Ward and the difficulty is to find any vacant appointment in the Manufacturing portion of the business which would be worthy of your son. There is also, I am afraid, no post of sufficient importance for him in the Inland Trade, and as regards the Liverpool or Export Trade, he would, even if we had an appointment to offer him at the moment, possibly be brought, to a certain extent into competition with his brother Mr H I Thompson.

2 February 1894, J W Thompson to J M Fells (Salt Union)

I cannot say that my father would be disposed to sell his reversions at all but if you are prepared to name a price I will submit it, if, it is at all in reason. I am sorry that your company does not appreciate the honour which my brother Alfred does them in

296 Calvert 1913, 2.
297 Calvert 1913, 4.
298 CRO D8645 LSW Copies of a series of letters John Thompson [Junior] Esquire and J W Thompson to J M Fells, Salt Union, Salters Hall Court, London.

offering his services nor the probable advantage. I should have thought it would have been better to take him as an ally rather than to drive him into compensation but this may be a matter of opinion.

5 February 1894, J M Fells to John Thompson

…My proposal was that we should purchase the freehold of the property that we hold under lease from you [Alliance Works], *and did not include the freehold of the other property…*

28 February 1894, J M Fells to John Thompson

Whilst I should be very pleased to meet Mr Henry Ingram Thompson to discuss any point of difference with him, I do not see that I can at this moment do so, pending an answer from him as to whether he desires to be appointed an agent or broker of the Company, but have not yet received any reply from him.

I do not think it would be possible to let the Witton Hall Mine and Salt Works to Mr Henry Ingram Thompson, as I am afraid such a course of action would only make matters worse.

22 May 1894, John Thompson to J M Fells

ALLIANCE WORKS

I have left the matter in the hands of my son to receive an offer. I only wrote to let you understand that to know where we stood together I was waiting for you to speak. I am not anxious to sell. My deep regret is that there seems to be no probability of getting that condition which you and I so much desired. Therefore, I want the Union (or you and I) to stand to good terms together. Why should we quarrel? I am quite convinced that I have sustained damage at the Works altogether amounting to a forfeiture.

29 May 1894, J M Fells to John Thompson

I will duly make a proposal to your son in connection with purchase of the reversion, but you will not, I am sure, expect me to agree that you have sustained any damage at the Works.

29 May 1894, J M Fells to J W Thompson

In November 1988, as you are doubtless aware Mr A J Thompson assigned to us his interest in a lease from Mr John Thompson of a plot of land at Marston. The lease was for a period of 50 years from Christmas 1886, and the rental was £22.10 per annum.

We also hold under direct lease from Mr John Thompson a plot of land at Marston for a period of 10 years from 24th June 1899, at a rental of £6.15 per annum. If I was to hear from you, as representative of Mr J Thompson, that you were willing to accept £500 for these two freeholds, I would ask my Directors to authorise me to make you the offer.

4 June 1894, J W Thompson to J M Fells

…the offer of £500 offered for the purchase of the two reversions is so far below the mark that I am instructed to decline it at once.

8 June 1894, J W Thompson to J M Fells

…on hearing from you that your Directors authorize an offer of £1,500 for the purchase of the two revisions I would ask my father to authorize me to accept the same.

12 June 1894, J M Fells to J W Thompson

MARSTON LEASES

…on this matter but in considering the proposal of £500 made you, we think you must have overlooked the fact that in the final settlement made by Mr Ward, all the mineral and brine under Mr Thompson's land anywhere in the County of Cheshire belong to the Salt Union.

14 June 1894, J W Thompson to J M Fells

In point of fact my Father has not conveyed to the Salt Union any of the mineral except Rock Salt and Brine under the land in question. Further the Conveyance is limited in operation to Rock Salt and Brine which he possessed on 3rd October 1890 in 'the Salt Districts of Cheshire' and does not apply to Rock Salt and Brine acquired since, nor to the whole country. …

…There is thus a very wide field for opposition to the Salt Union and a greater value in the reversions

than you appear disposed to put upon them. The sum of £1500 mentioned by me is the lowest sum which I am disposed to recommend for acceptance.

It was in the light of these disagreements with the Salt Union, John Thompson (junior) and Henry Ingram Thompson re-established themseves as an independent producer. Their assertion of the right to discover and acquire new rock salt and brine fields led to the sinking of a new brine shaft and the erecting of a salt pan in the coal yard of the Red Lion Hotel, Marston in 1894.

The incident caused clear resentment on the part of the Salt Union and led to a dispute about damage caused to the Salt Union supplies. A chancery case, the Salt Union Limited v Henry Ingram Thompson, ensued. The Salt Union tried to claim that the brine supplies had been damaged Arthur Johnson of Marston, took a sample of bottom brine and top brine from the Alexander Shaft and handed it to James Raynor of the Salt Union. Thomas Raynor of Wincham took the brine to Charles Mountain Blades Analytical Chemist in Northwich for analysis. This was in order to prove that the brine supply had been damaged by the pumping from the adjacent Lion Salt Works shaft by Henry Ingram Thompson. [299]

Phase 5: 1899–1910; Henry Ingram Thompson

Henry Ingram Thompson was not alone in facing litigation over the interpretation of agreements with the Salt Union, as many proprietors were entitled to commission on the salt produced at the works they had formerly owned or on salt sold under their 'brand names'. [300]

The relationship between Henry Ingram Thompson and the Salt Union had improved slightly by 1906. The company was approached to join the reformed Salt Union. How much this was a friendly approach or hostile take-over is indicated by the fact Alan Kinsey Thompson was asked to leave the meeting. The terms were not in favour of the Thompsons and they once more declined. However, it was clear that principal trading partners of the Salt Union, Blaumüller Klombies and Co Ltd, would continue to buy the Thompsons' salt, the Salt Union would supply the Thompsons with salt in times of shortfall and would not '*harass your business in any way as long as you work in agreement with us*'. [301] The Thompsons continued to distribute salt through the Salt Union in the early years of the 20th century.

The correspondence above shows that Henry Ingram Thompson's two sons Jack Thompson (the 1st child) and Alan Kinsey Thompson (the 5th child), were clearly involved in the day-to-day running of the business as early as 1906. It is probable that this followed the later model where Jack Thompson appears to have been based in the Liverpool Office, whilst Alan Kinsey Thompson was based at Marston.

The relationship between Henry Ingram Thompson and his brother, Alfred Jabez Thompson appears to have been poor. The dispute may date back to the death of their father. Whilst Henry Ingram Thompson received the majority of the estate of his father, the other brothers, John William Thompson and Alfred Jabez Thompson received little. This may in part explain John Thompson Junior)'s attempts to secure his son a position with the Salt Union.

The Sunbeam Works and Alfred Jabez Thompson's works in Wincham backed on to each other; both were leased from the Wincham Hall estate through the Estate Agent, E Gandy and Sons Ltd. A letter dated 1 April 1911 details the issues:

I am in receipt of your letter of yesterday. I was in ignorance of any difference between your brother and yourself and very much regret to find your brotherly relationship so strained…[302]

This reached a head in 1924 when Alfred Jabez Thompson tried to bore for brine on his property in Wincham. A dispute arose as to whether salt could be bored within '120 yards' of the Sunbeam borehole. [303]

299 The Salt Union Limited v Henry Ingram Thompson: In the High Court of Justice Chancery Division, Mr Justice North; 1894.S.4110.
300 Didsbury 1975, 174.

301 CRO D8645 LSW 90/412/166, Letter, 7 September 1906.
302 CRO D8645 LSW 90/412/162, Letter, 1 April 1911.
303 CRO D8645 LSW 90/412/517, Letter, 12 August 1924.

The family business clearly became split. Henry Ingram maintained the business in Marston and Wincham, whilst Alfred Jabez Thompson operated an entirely separate business in Wincham, with the unfortunate consequence of working on adjacent land to the Sunbeam Works.

By the 20th century whilst the core of the salt production was maintained at the two works, the Lion Salt Works, Marston and Sunbeam Works, Wincham, the company had their main offices in Liverpool. At the turn of the 20th century they had two addresses in Liverpool; 7 Rumford Street and an address for 'Cables and Telegrams' at 'Saltcastle' (6.18).


STEAM & SAILING LIGHTERS FOR CHARTER ON TIME OR FREIGHT

ESTABLISHED 1842.

INGRAM THOMPSON & SONS

SALT PROPRIETORS,

CHESHIRE.

"SALTCASTLE, LIVERPOOL."

7, RUMFORD STREET,

LIVERPOOL, 8th June 1907

To Lion Salt Works,

By the S.C.C.

'Alice Pappin' we send you up yesterday

6.18: The letter head for delivery notes showed that the Thompson's had salt works at Marston and Wincham and two addresses in Liverpool; 7 Rumford Street and an address for 'Cables and Telegrams' at 'Saltcastle'. [304]

A series of delivery notes indicates the division of management between the sites. The management of the business affairs was conducted from the Liverpool Office. In the early 20th century the Liverpool Office was run by Henry Ingram Thompson. This involved the majority of the international trade and business accounts. They advertised themselves principally as 'Steam and Sailing Lighters for Charter on Time or Freight'. The office in Marston was answerable to the Liverpool office as indicated by the occasional curt telegram:

'Send the checked monthly accounts back here today certain if you have not already done so.' [305]

The works in Marston and Wincham were run by a site manager and site clerk. The Marston and Wincham office was in the rooms of the Manager's House, the one to the north occupied by the clerk, with the Manager in the room to the south. There was another clerk at the Thompsons' Liverpool office. Some of the ledgers and paperwork from these offices survive and can be used to interpret how the business was organised. The site clerk in the early 1900s was Mr Stelfox. [306] His family later appears to have gone into business with the family solicitors to form Dixon, Stelfox and Cross (see Jacob Dixon above). [307]

Although, the day-to-day management of both the Lion Salt Works and Sunbeam Works was conducted from the Manager's House, direct instructions were still received from Liverpool, on the minutiae of running the salt works:

Carry out precisely instructions given you about keeping new salt apart from the dry salt. The salt drawn today Thursday must not be filled in sacks until Saturday earliest or Monday and salt drawn on Friday must not be filled in sacks until Monday or Tuesday. … Draw all Common Pans on Saturday if necessary as no salt drawn on Monday must be filled in these sacks. Put Routledge and Eton to help fire the pans and open them out, both if necessary but I think one will be enough I think. Work them the best you can to get the most out of the pans. [308]

This perhaps indicates the authoritarian nature of Henry Ingram Thompson, the Edwardian gentleman, as opposed to a hands-on site manager. It also shows a man who understood the nature of salt production in all its detail.

304 Heading on top of the delivery notes gives the two Liverpool addresses. It indicates that the company changed its name from Henry Ingram Thompson to Ingram Thompson and Sons in about 1905, e.g. CRO D8645 LSW 90/229/92: Delivery Note, 28 February 1908.

305 CRO D8645 LSW 90/229/92: Delivery Note, 28 February 1908.

306 Several notes are addressed not to the Thompsons but *'Mr Stelfox, Messrs I Thompson and Sons, Lion Salt Works, Marston'* e.g. CRO D8645 LSW 90/ 229/159: Delivery Note, 18 December 1909.

307 E.g. letter regarding Search of Land Registry, CRO D8645 LSW 90/412/9.

308 CRO D8645 LSW 90/229/54: Delivery Note, 4 July 1907.

Phase 6–7, 1938–1986

On the death of Henry Ingram Thompson the business passed into the hands of Jack and Alan Kinsey Thompson. Unlike the previous generation, this became a sound business relationship. It had developed over the previous three decades since the opening of the Lion and Sunbeam Salt Works in the late-19th century. They were replaced in the 1950s and 1960s by the next generation who included Henry Lloyd Thompson, Bruce Thompson and Jonathan Thompson.

The open-pan salt trade was in general decline by this time and was being slowly replaced by vacuum evaporated salt. However, the Lion and Sunbeam Salt Works continued to operate as an anachronism of a previous era. The value of the business was estimated as a result of the Town and Country Planning Act 1947:

- *Lion Salt Works £620. Lion Salt works amount is based on 4d per 1,000 gallons on our output of about 4,000 tons a year @ 1,000 gallons to the ton.*
- *Sunbeam Works £350. Sunbeam Salt Works is more complicated, we only come in as Lessees for compensation @ 3d per 1,000 gallons for 24 years at a minimum of £50 per annum multiplied by 7½%.* [309]

They suggest that the Sunbeam Works by the 1950s were about half the size of the Lion Salt Works, although the figures were adjusted to accommodate their status as the lessees. The Sunbeam Works was to close in the 1970s (see below) and the Lion Salt Works followed in 1986.

The relationship between the Thompsons and their workers appeared to alter through the generations. The authoritarian and formal relationship of Henry Ingram Thompson was replaced by the twin management of Jack Thompson and Alan Kinsey Thompson. Jack Thompson continued to run the Liverpool Office. Alan Kinsey Thompson developed a less formal relationship that indicates the break-down in the social barriers from the period before the First World War to the end of the Second World War. Speaking in 1988 Henry Thompson described the early post Second World War business set up that survived for the next 30 years.

…I was a very junior part of the operation [in *c.* 1947 at the age of 22 years] *and I went through the whole process from the practical side of making salt and also the commercial side, the office side if you like to put it that way and I was a very junior member. The two directors, at that time were my father and his brother [Jack Thompson and Alan Kinsey Thompson], my father being based in Marston and his brother in Liverpool. In those days it was convenient to have an office in Liverpool which was close to the docks and they were able to arrange shipping facilities etc much more easily than doing it from Northwich. So that's how it was set up when I started and that's how it remained I suppose, well 35 years…* [310]

Norman Eaton recalled Alan Kinsey Thompson and the young Henry Thompson in the years shortly after the Second World War.

…both [Alan Kinsey Thompson and Henry Thompson] *were down-to-earth but always gentlemanly. Both wore clogs like the men, travelling on the first train from Cuddington in the morning and walking across the 'Old Hole'* [The Northwich Subsidence at Neumann's Flash] *to work. Mr Thompson* [Senior, Alan Kinsey] *used to go to the bank on Station Road, Northwich, later, and then collect a pack of liver from the Butcher's in Station Road, then walk back and fry this up on a gas-ring in the Office. Commercial traveller types he liked to see while he was frying up his dinner as it did not detract from his attentions within the Works. He had quite a lot of apt sayings, such as 'you can never satisfy the working man' and 'I never ask a man to do anything I cannot do myself'. This latter I would think is very true.* [311]

309 CRO D8645 LSW Letter dated 25th May 1955, John Thompson to Alan Kinsey Thompson, Valuation of Lion Salt Works, Claim for Depreciation of value as a result of Town and Country Planning Act: Mineral Development Value, by Mr Duncombe and Mr McQueen. *These figures are based on the difference between the unrestricted value of the land prior to the Town and Country Planning Act and the restricted value. (ie. for LSW £655 (unrestricted) - £35 (restricted value) = £620).

310 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

311 CRO D8645 LSW Norman Eaton, oral history transcript, 27th March 1989.

Each generation changed from the last, they brought new methods to the work, but also a closer relationship with the workers.

After Mr Thompson Senior [Alan Kinsey] *'handed over', 'Young' Mr Thompson* [Henry] *seemed to do a lot of modernising, and when one went in the place seemed quite different. I still got my block of salt but the price had gone up to 3/6d* [stated previously - *28lb block of rough salt, which I think was 2/6d*]. [312]

By the time his son was in charge of the works, he was very much a hands-on man. Henry Thompson was capable of most jobs on the salt works:

I suppose that I was a jack of all trades in some respects. I had to be. I had to know how to build and to set bricks and knowing how to build a salt pan roof and sides which didn't do the splits when the thing had been working perhaps a couple of years. I also did, I think most, in fact all the jobs that went on, on the works. I had a go at them all and I spent most of my working day, either filling bags or handling salt. I didn't believe in standing around with my hands in my pockets watching other people do it. [313]

The Liverpool office moved in the mid-20th century from 7 Rumford Street, Liverpool in 1950 [314] to 3 Rumford Street, Liverpool in 1952. [315] When the Thompson's opened a bank account with Martin's Bank in 1960, the Registered Office was Ingram Thompson and Sons Ltd, 3 Rumford Street, Liverpool, with a further address at 20 Castle Street Liverpool (Saltcastle). The company was listed with three directors at this time: Alan Kinsey Thompson, Henry L Thompson and Bruce Thompson. The very shaky handwriting and signature of Alan Kinsey suggest he was of advance years and taking no part in the business. [316]

The clerk in the 1960s and 1970s was a man called Henry Sammy. He had a one-eyed cat that lived in the Manager's House. The wages were paid in the Meeting (Southern) Room of Manager's House. Although some have stated that the money was passed through the white hatch in the Clerk's Office window, it would appear that the men came into the meeting room. The money was distributed in a little 'sardine' tin. The men took the money and then handed the tin back again. [317] Jonathan Thompson recalled how he introduced formal wage packets in the 1970s. [318]

The wages continued to be negotiated with the unions, particularly the British Salt Federation and the Salt Manufacturer's Association. [319] However, much of the lumping was still done on a piece work basis.

Jonathan Thompson originally worked at the registered office in Liverpool, but moved to Marston in the 1960s when he was apprenticed to the works. Although initially working in a hand on role, at a junior level in the business he eventually rose to run the business in conjunction with his cousin Henry L Thompson. [320]

6.19: This image of Henry Lloyd Thompson is in the Clerk's Office of the Manager's House. It became Henry's office towards the end of the works, the range making it a far warmer place to work. [321]

By the mid-1970s the registered office in Liverpool was at 113 The Albany, Old Hall Street, Liverpool,

312 CRO D8645 LSW Norman Eaton, oral history transcript, 27 March 1989.
313 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
314 CRO D8645 LSW 90/412/138.
315 CRO D8645 LSW 90/412/62.
316 CRO D8645 LSW 90/412/30.
317 CRO D8645 LSW Alfred Bentley Johnson, oral history transcript, *c.* 1989.
318 CRO D8645 LSW Jonathan Thompson pers. comm. to Chris Hewitson, 15 January 2014.
319 CRO LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.
320 Jonathan Thompson, pers comm to Chris Hewitson, 15 January 2014.
321 Photo courtesy of the Thompson Family

L3 9PG. The directors were Henry L Thompson and Bruce Thompson by this time. [322]

In the last few years in the 1980s the business was very small (6.19). Henry Thompson suggested that:

'*[In 1982] we eventually moved the registered office from Liverpool to Marston because the West African business was changing and there was no further need for it in Liverpool. So we closed it down and brought the whole thing to Marston.* [323]

The Salt Workers

Salt Workers in Marston and Wincham the 19th and Early 20th centuries

The census returns for Marston and Wincham give some idea of how many people were employed at the various salt works in this area between 1841 and 1911. The figures, however, are likely to be an underestimation because it appears that not all those employed in the salt industry were specifically identified as such, but were instead recorded under more generic job titles. The nomenclature used for the occupations of those within the salt industry itself is inconsistent, often imprecise and undoubtedly subjective. Nevertheless, a broad picture emerges of the development and vicissitudes of the salt industry based around the two communities. The main division, observed throughout the period, is between those involved in mining and those working in manufacturing. The divisions of labour within these two branches do not seem to have been so carefully defined, or considered to be particularly important, possibly because they were confined to the salt industry rather than having more universal recognition like the apprentice-based trades with wider application.

Rock Salt Mining

In 1841 it was mining that was the main activity with 84 men being listed in the two communities as rock salt miners. In 1851 there were 83 rock salt miners, but another two individuals, who described themselves as rock salt pickers, must be added to the total. By 1861 the number of miners had increased to 93; ten years later the number stood at 85, but there were also four men who were described as rock mine labourers and there was also an engineer. In 1881 there was a record number of 129 miners plus one rock picker, a rock salt mine setter and one labourer; in addition there was an engine driver and a mining engine man. By 1891 the number of miners had dropped to 95, and by 1901 to 49, although there had been a partial recovery in 1911 when the number stood at 59. Although the census returns do not show much differentiation between the men who described themselves as rock salt miners, the Wages Book for Wincham Hall Mine of 1887–1888 records a good deal of variation amongst the workers at the mine.[324] The principal division was between Rock Getters and Ferriers, but there were other tasks including loading, grinding, picking and filling rock. There was also a 'hooker on', a 'slide turner', two engineers, a blacksmith, two stokers, a wagon repairer a tipper, two carpenters, and two smiths.

Salt manufacturing

In 1841 there were 21 'salt makers' in Marston (16) and Wincham (5). The term 'salt maker' seems to have been used to describe those working in manufacturing rather than mining, but does not appear to have been any more precise, and it may be that the various trades that developed in salt manufacturing were yet to be fully defined. By 1851 specialisms were starting to be distinguished, so that in Marston there were eight salt boilers and one white salt maker, and in Wincham four salt works labourers involved in salt manufacturing. In addition both communities housed a pan plate worker. The number of workers was considerably reduced from the 1841 levels, and although Marston retained its primacy in the distribution of numbers it was the most affected of the two villages.

By 1861 the collapse in the number of salt workers had been more than compensated for. Overall, 67

322 CRO D8645 LSW Letter head, includes details of Liverpool and Marston offices, VAT No etc…, dated 29 September 1975.
323 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

324 LSW NOCMS 1986/1783/3/14.

salt works personnel were listed, only 17 of whom were based in Wincham. Three men described themselves as salt makers, 22 as salt boilers and three as white salt boilers, and there were 29 salt works labourers. One man is designated a 'block maker', perhaps denoting a lumpman, and, for the first time in the returns, a fireman is listed. In addition there were a number of salt works employees offering support services including an engine smith, an engine driver and blacksmith, and a carpenter. There were also two pansmiths, and an administrative echelon is evident in the presence of two salt works managers and a clerk.

6.20: Traditionally the salt workers wore a loose fitting shirt and short trousers called 'drawers'. Due to the heat and humidity of the pan houses the men worked bare chested when making salt. This picture taken at the end of the 19th century at the Lion Salt Works shows a typical salt worker. Note the shirts hung on the far wall. [325]

In 1871 there were still 25 salt boilers but also two wallers and three lofters, suggesting that a sense of specialism was becoming more ingrained. The 1871 returns also record the first woman salt worker to be so identified; she was Elizabeth Walton, the daughter of a salt boiler, is described as 'helper at salt works'. In addition, the number of fireman and labourers had shot up to nine and 98 respectively. The number of support staff had also increased with four blacksmiths, two joiners, two engine firers, an engine driver, a carter, a brine pit stoker, a brine pit engineer, and no fewer than nine pansmiths. The scale of operations had clearly expanded enormously, but only one manager is recorded and no other administrative staff.

By 1881 the prosperity reflected in the 1871 returns was slightly dimmed, the earlier high point of 167 people employed in salt manufacturing having reduced to 136. The level of administration had increased, staff now numbering one manager, one clerk, three office boys, a time keeper and two foremen. The number of manual workers, however, had decreased from 166 in 1871 to 128. Of these 105 were production staff divided as follows:- 47 salt boilers, 15 salt makers, 2 lofters, 8 firemen, 2 furnace men, 27 labourers, 2 helpers at salt pan, 1 salt drawer, and 1 helper at salt works. The 21 support staff of the 1871 returns had risen to 22 a figure that included 18 pansmiths.

In 1891 there were two managers, one clerk and six foremen. The designations of manual workers had changed markedly so that, although the number of employees engaged on production had risen above the 1871 level and now stood at 131, some of the occupations had decreased significantly. There were now six salt makers, 14 salt boilers, 13 firemen, four furnacemen, 94 labourers and one salt worker. Manual support services were represented by 36 pansmiths one engine fitter, eight stationary engine drivers and one railway engine driver.

The 1901 census shows that ten years later the number of production staff had fallen again now amounting to 76 divided as follows:- 28 salt makers, four salt boilers, three firemen, one furnace stoker and 40 labourers. The other manual workers comprised 10 pansmiths, 2 salt engine drivers, 2 stationary engine drivers (brine pumping), two loco engine drivers, two engine fitters, a salt pan flue sweeper, a boring engineer and a carter. Management and administration amounted to two managers, six foremen, three clerks, an office boy and an errand boy.

In 1911 non-manual employees included one manager, three clerks, and one brine mains inspector. Production staff amounted to one salt worker, eight salt boilers, seven salt makers, one salt bagger 77 labourers and nine firemen. Manual support staff were five wagon builders, eight stationary engine drivers, three bricklayers, one brick setter, one bricklayer's labourer, one joiner, two engine fitters, two boiler makers, seven

325 Lion Salt Works collection, Weaver Hall Museum and Workhouse

pansmiths, one rivet runner, two riveters, four blacksmiths, five blacksmith's strikers, four carters and three canal boatmen.

19th-Century Work Practices

In the early years of the Alliance Works, the mid-19th-century industry was markedly different from the 20th-century industry. In the 19th century the salt works employed the lumpmen on a piece basis. That is to say, they were provided with the raw material to produce salt; the coal, the brine and the pan. They were then set down to work the pans and were paid at a tariff per ton produced. This led to workers employing their families within the works to supplement the labour. It was quoted that; *'…in 1876, women, young persons, and occasionally children are employed… in a proportion of 40% of the whole number of persons employed.'* [326]

The men were generally at the pan houses by 3 or 4 in the morning, and could work a 16 hour day before they returned home. [327] The women and older children would attend the work after each 'drought' or salt boiling to attend to tasks of skimming the salt, happing the blocks and loading the blocks into the stoves. The younger children would work in the warehouses crushing salt. They would go home between each drought, lasting 3–4 hours before the next one was boiling and attend to household tasks, before returning to continue the process again at noon. [328] The factory inspector for 1882 reported:

'*The men, women and children were kept in the pan shed the life-long week, getting their meals as they could within the walls and sleeping in some cavity which they had managed to hollow out in the neighbourhood of the furnace*'. [329]

Women's labour was limited by the introduction of the Factories and Workshop Extension Act in 1867. Likewise, child labour was limited by the introduction of compulsory schooling under the Education Act of 1870. Women were only allowed to work between the hours of 6am and 6pm. Shed work was regarded as too hard and heavy for women. In addition, the moral society of the Victorian era, were shocked to discover that women were working in their petticoats because of the intense heat within the stove houses. Young women under the age of 18 were eventually banned from the heavy work in the salt works, but continued to undertake the packing and stitching jobs. [330]

They normally worked six days a week with Sunday reserved for attending church. When orders were high for common salt to the international market it was normal to make the workers continue through the weekend to complete orders as mentioned in one of the delivery orders from the early 20th century:

As we have orders in for 160 tons Factory Filled Salt please arrange to work all three stoved pans on Light Factory Filled Shorts this weekend over Sunday. We are sorry to do this but owing to past stoppages and not being able to turn out more on ordinary working days, it is inevitable. [331]

6.21: This image appears to show the men of the Lion Salt Works lined up in the street outside the works as part of Armistice Events. The Coronation Salt Store and Pan and Stove House 3 are in the background. Some of the men are dressed in their best clothes, whilst others appear to have come from their shift in the salt works. [332]

326 P.P. 1876 Factories and Workshops Act commissioners' Report (C 1443) xxix, Vol. 1, App. D, No. 94.
327 Rochester n. d. (d).
328 Didsbury 1977, 155–156.
329 P.P 1887 Factory Inspectors' Yearly Report to 31 October 1886 (C 5002) xvii, 69.
330 Rochester n. d. (d).
331 CRO D8645 LSW 90/229/93: Delivery Note, 18 March 1908.
332 Lion Salt Works Collection, Weaver Hall Museum and Workhouse

The industry was subject to seasonal fluctuations in work. Whilst the summer months comprised the peak period, during the winter months, particularly from Christmas to Easter, work was very slow. Key markets, including Fishery Salt did not create high demand. Salt workers would see several months from January to March with little or no work. This meant they worked flat out during the rest of the year to produce sufficient money to see them through these quiet periods. [333]

The formation of the Salt Union in 1888, and the decline in trade from the late-19th century led to closures of less economic works. Industrial action followed, resulting in a reordered work force. Wallers, who made common salt, formerly discharged their own coal and loaded boats as part of their jobs. Labourers were now employed to do this work. [334] It is difficult to understand how this affected the workers at the Lion Salt Works who fell outside the remit of the Salt Union.

20th-Century Work Practices

In the 1940s the workforce at the Lion Salt Works varied fluctuated between 29 and 34. [335] These were mostly men, but included five to eight women and two to five boys. For most of this period there was an engine driver (William Noden), a smith (Arthur Dickens), a bricklayer (Albert Spencer), a joiner (Leonard Jackson), a boatman (William Gleave), a holder up, six lumpers (three to each of two salt pans), and three lofters. Only in 1948 were any (two) wallers listed; sometimes there was a fireman, sometimes not, and there were normally between four and six labourers, although, exceptionally, in 1950, there were eleven. Job descriptions for individuals varied, suggesting that some men were only temporarily employed in some capacities. George Astles was a holder up in 1946, a smith in 1948, and a labourer in 1950; Fred Thompson was a labourer in 1946 and 1947, but had graduated to being a lumpman in 1948 and 1950.

In the 1940s, lumpmakers were paid on a piece rate not hourly wages. They were paid about 8 shillings a ton of salt and made about 25 tons a week (72 lumps of lagos salt made a ton) – i.e. 1 ½ pence a lump of salt. Their average weekly wages would be about £10 10s 10d. In comparison Lofter/ Laboureres were paid on an hourly rate Mon-Sat 9 ½ hour day, 47 ½ hours a week made around £5 8s 4d a week typically. Stitchers, usually women undertaking packing jobs were paid a lot less, working various days, in total about 25 hours made £1 19s 5d a week (i.e. a lot less). [336]

By the 1960s many of the auxiliary trades were being sub contracted to people outside the Lion Salt Works. In the 1950s the Lion Salt Works used to employ a smith and apprentice, joiner and apprentice, bricklayer and apprentice. [337] Henry Sutton was the joiner. He made the salt tubs. Alfred Bentley Johnson's father-in-law worked in the smithy. [338] The smithy was closed in 1962 or 1963, because there was insufficient pan-working to warrant its continuation. [339] To compensate, a number of metalwork companies arose to support the salt industry. Johnny Fletcher, blacksmith at Rudheath welded the pans. [340] When Jonathan Thompson first began in the 1960s, the Thompson family business employed forty people when all five lump pans at the Lion Salt Works and three common pans at the Sunbeam Works in Wincham were operating. [341] A series of charts detailing holiday pay with individual names give an indication of the workforce employed at the Lion salt Works in the following 20 years between 1966 and 1986 prior to closure (6.22). Not only do they give individual names, but they also allow the workforce to be charted over a number of years. In 1966 each employee received 14 days holiday pay; by 1986 this had increased to 20 days.

The charts suggest that there was a marked decline in the number of people employed at the works (6.23, 6.24). In the 1960s around 40 people

333 Didsbury 1975, 158.
334 Rochester n. d. (d).
335 LSW NOCMS: 1986/3783/1, 25–28.

[336] Ledger from Lion Salt Works, November 1945 to August 1965; NOCMS : 1986.3783.1.12
337 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.
338 CRO D8645 LSW Alfred Bentley Johnson, oral history transcript, *c.* 1989.
339 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.
340 CRO D8645 LSW Alfred Bentley Johnson, oral history transcript, *c.* 1989.
341 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.

were employed at the Lion and Sunbeam Works. This peaked in 1967 at 42 people. Many of these were casuals and would be employed for a short period during the summer when production was at its peak. By the mid-1970s the works had become more automated, with the use of oil and the automatic skimming mechanism. The Sunbeam Works in Wincham also closed. The workforce declined to around 20–25 people employed annually from 1974.

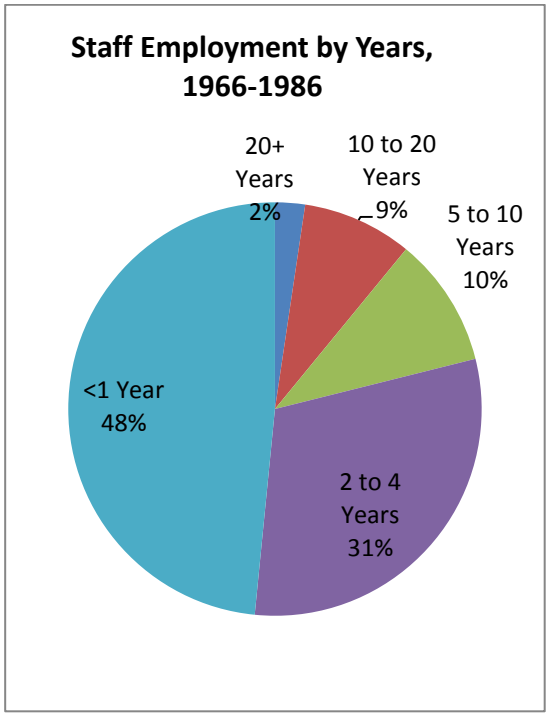
When the Lion Salt works became a 'working museum' in the 1980s fewer than 10 people were employed 5 men and 5 women, 12 people at maximum for the last few years. [342] The workforce employed was casual. The work was highly laborious and not technically skilled. From 1966 to 1986, around 50% of the workforce was employed for less than a year. Of the remainder only 30% worked for the Thompsons for more than 2–3 years before they finished.

6.22: A series of charts detailing holiday pay with individual names give an indication of the workforce employed at the Lion salt Works in the following 20 years between 1966 and 1986 prior to closure. Not only do they give individual names, but they also allow the workforce to be charted over a number of years. In 1966 each employee received 14 days holiday pay; by 1986 this had increased to 20 days.

342 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.

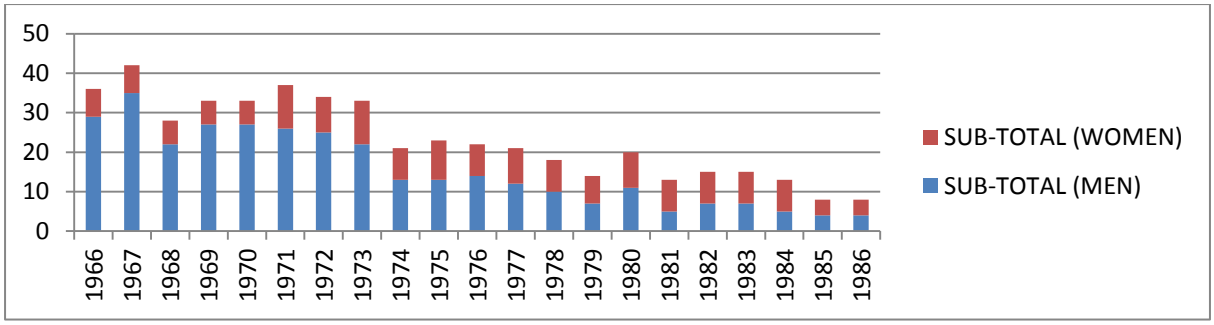
As the work declined in the 1960s some men left or were let go. Some like H (Harold?) Yarwood worked up until his death on the 2nd October 1968. Others, like AE Taylor, retired in 1969. A number of experienced salt workers F Forster, F Walton, K Harrison and R Ashbrook were let go or left in 1973 when the works became more automated. Further experienced salt workers including F Millington, W Neild, J Flood, and W Clarke left in the 1976 and 1977 when the works were beginning to experience difficulties. Many of these men worked on piecework basis as opposed to formal contracts and it may have been that they were unable to make sufficient money from salt making to justify continuing the work.

Only three members of staff worked continuously from the 1960s until the closure of the works. These were Horace Heath, C Hitchens, and R Clarke. They continued working into the 1980s demonstrating how salt was made as well as fulfilling the remaining orders still placed for block and Lagos salt. The final workers at salt pans would earn about £150 a week piece work by 1986. [343]



6.23: % of staff employed by years at the Lion and Sunbeam Salt Works, 1966–1986, taken from charts showing holiday entitlement, Lion Salt Works Collection

343 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.



6.24: Number of people employed by the Thompsons 1966–1986, taken from charts showing holiday entitlement, Lion Salt Works Collection.

Accidents in the Salt Industry

In the 19th century, there was no formal reporting of accidents. They appear to have been common, and included falls into the boiling brine, scalds, burns and fractures. Anyone who fell in unobserved would probably, like William Coppack in 1888, be found dead in the pan the next morning. [344] The view expressed by the Departmental Committee on Miscellaneous Dangerous Trades in 1899 was that, '*considering how difficult it is to see owing to the dense clouds of steam and how slippery the hurdles and gangways become from the constant damp, there can be no surprise at the occurrence of such accidents*.' [345]

Accidents involving the pans appeared to have occurred within living memory. Mr Iredale suggested an accident in which a young lad called Lowe fell in the pan and died, whilst another employee, Richard Bowyer fell in was scolded but survived. [346] This is perhaps indicative of the stories that surround the salt trade as Annie Lawton recalled that Mr Lowe was scalded when he fell into the outside pans. [347] It is possible that this was Gerald Astles Lowe who was born in 1907 in Northwich. The incident is mentioned in passing in a letter of 1948, which makes reference to 'Gerald Low who was scalded on 12 June 1938 at Sunbeam Works'. [348] Interestingly, a Gerald A. A. Lowe, aged 31, died sometime between April and June 1938, the death being registered at Northwich. [349] Members of his family recall that Gerald fell into a salt pan, managed to get out, road his bicycle home where a doctor was called and he sadly died. Gerald Lowe lived at 28 Ollershaw Lane and was one of three generations of salt workers. His father Jim and grandfather Thomas were both rock salt miners at the Adelaide Mine. [350] The Thompsons recalled a tolerant approach on the whole from the Health and Safety Executive:

I can't say that we were adversely affected by present day measures. We used to, of course, have visits from the Health and Safety Executive to see that we were behaving properly and I never had any trouble from them. In fact, most of the inspectors were, what shall I say, not shocked, but surprised at the way open pan salt was produced, because we were the only ones in the country actually doing it. But I had a very good association with the inspectors. They were tolerant and sensible. I can think of one who was not, who was in fact a woman who gave me an awful lot of trouble but apart from that it was a fairly good association. [351]

The perception of the process of raking-out was that it was a dangerous one, but the reality was that banks of salt built up along the sides of the pans protecting the workers who were drawing the pans. [352]

344 Departmental Committee on Miscellaneous Dangerous Trades, quoted in Didsbury 1975, 157.
345 Rochester n. d. (d).
346 CRO D8645 LSW Mr Iredale, oral history transcript, *c.* 1989.
347 CRO D8645 LSW Mrs Annie Lawton, oral history transcript, *c.* 1989.
348 LSW NOCMS: 1986/3783/1/24, 206.

349 Death Index.
350 Margaret Corris (nee Lowe), *pers. comm*. With Chris Hewitson, January 2015
351 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
352 Pers comm. Final Factory Inspector at Lion Salt Works, *c.* 1980s to Chris Hewitson, September 2012.

7. THE TRADE NETWORK

The 19th century trade

Our understanding of the Thompsons' salt trade in the 19th century is limited by the absence of available records from this period. Henry Thompson, speaking in 1988, suggested that the Thompsons' early years were associated with export to the Indian markets: *…having moved to Marston the business was, basically, trade with the Indian continent…*[353] In 1881 out of every 100 tons of white salt shipped in Liverpool, 38 were for the East Indies. Calcutta and Rangoon—Calcutta especially—and occasionally Chittagong monopolised the trade. [354] There was no demand for salt in Bombay or Madras (see 7.1). In August 1872 a load of 2,125 tons (2,159 tonnes) was shipped to the latter port by way of experiment. For fifteen months the consignees endeavoured, without success, to dispose of it, but the prejudice against English salt was too strong, and it was re-shipped in the end to Calcutta. [355]

In general by 1880 of around 1.1 million tons of salt were exported from the ports of Liverpool, Birkenhead and Weston Point. Of these around 235,000 tons were shipped to ports in the UK and Ireland, 310,000 tons were shipped to India, 265,000 tons were shipped to the USA, 110,000 tons were shipped to Canada, 125,000 tons were shipped to Europe, whilst smaller amounts were shipped to Australia, New Zealand and South America. The African market that was to become so significant in the 20th century received only 30,000 tons at this time. [356]

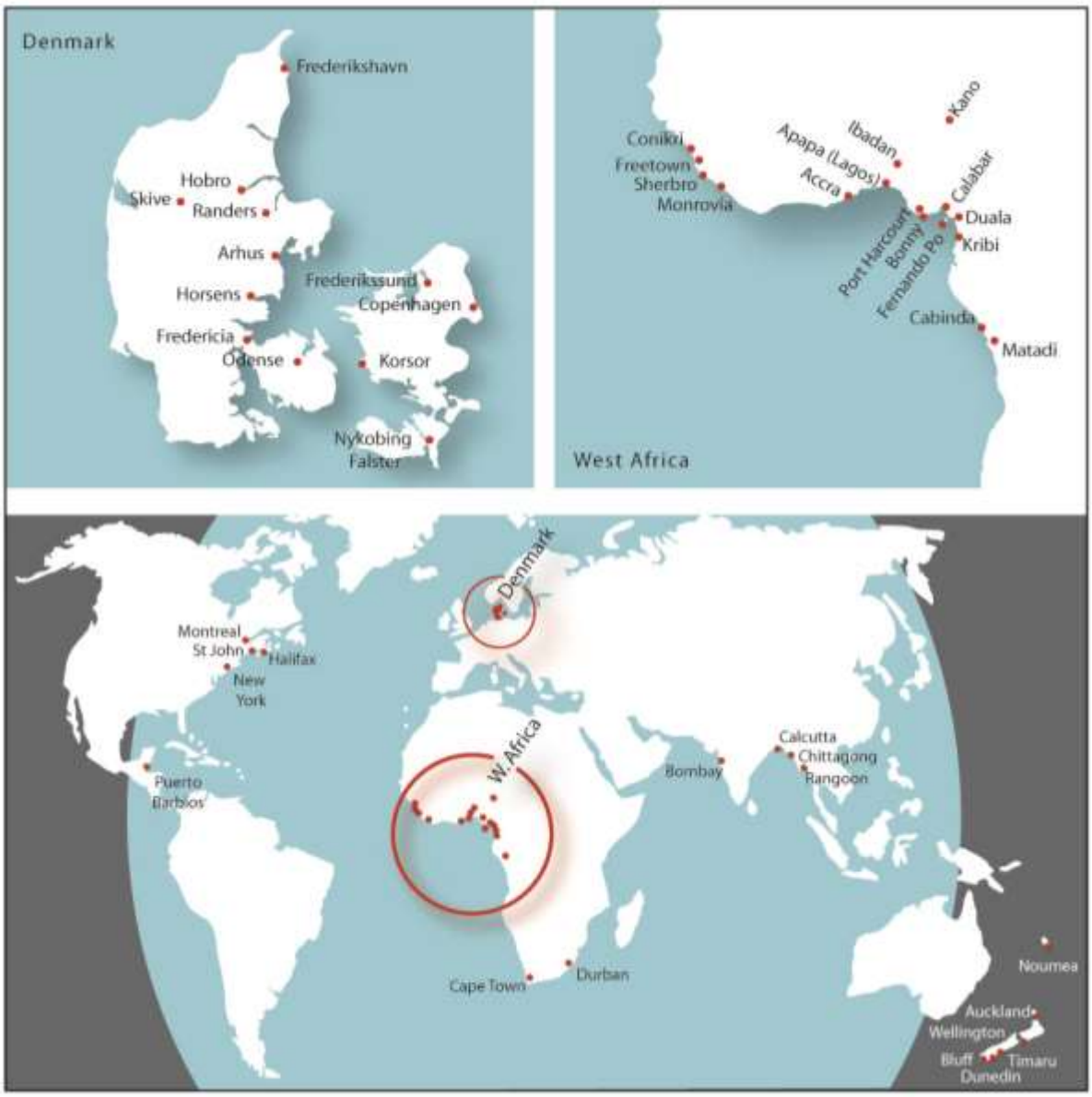
One exception to the general dearth of detailed records for the 19th century is a ledger for January 1884 to January 1889, the last few years of business before the takeover by the Salt Union. From this a list of domestic customers can be compiled; [357] seemingly, the greater part of the domestic market appears to have been amongst the manufacturers of the north of England. There were also three Thompson companies amongst the regular customers: John Thompson and Son, Liverpool, Alfred Jabez Thompson, Northwich, and Jabez Thompson. Jabez Thompson, no longer having an active interest in the salt business, was a customer for cinders and coal, and also hired wagons. Alfred Jabez Thompson, who managed the Alliance works, took frequent consignments of a wide range of salt products, in addition to coal, and, like Jabez, also hired wagons from time to time.

John Thompson and Son, Liverpool, bought salt for a handful of domestic customers, the principal ones being the chemical manufacturers, McKechnie of St Helens, and Muspratt and Sons of Widnes. However, the company also seems to have conducted an export trade, with orders frequently being dispatched directly to dockyards, mostly Cardiff, but also Fleetwood and Runcorn. There is some reason to suppose that much of this implied export trade was aimed at Canada. The names of most of the ships recorded in the ledger are to be found on the Canadian Ship Register Index, the majority having been built in New Brunswick and Nova Scotia. [358] Canada became a significant market for the Thompsons after the establishment of the Lion Salt Works in 1894 (see § 7.6.2 below), but it seems that it was already an aspect of their trading network before the advent of the Salt Union.

After the formation of the Salt Union the market through the following five years was extremely poor until the mid-1890s. It appears to have improved sufficiently to allow the Thompsons to establish, once more, their business interests in White Salt production.

353 CRO LSW (not accessioned) Henry Thompson, oral history transcript, 1988.
354 Calvert 1915, 497.
355 Calvert 1915, 497.
356 Calvert 1915, 496
357 LSW NOCMS: 1986/3783/1/9.

358 www.collectionscanada.gc.ca/databases/ship-registration . The names of the ships recorded in the ledger that appear in the index are the Abyssinia (1885, New Brunswick), Ann Clark (1848, Nova Scotia), Arcadia (1873, New Brunswick), Bremen (1886, Nova Scotia), Celeste Burrill (1886, Nova Scotia), Conqueror (1885, Quebec), Economy (1874, Nova Scotia), Governor Tilley (1885, New Brunswick), Lord Dufferin (1876, Nova Scotia), Minnie Browne (1881, Nova Scotia).

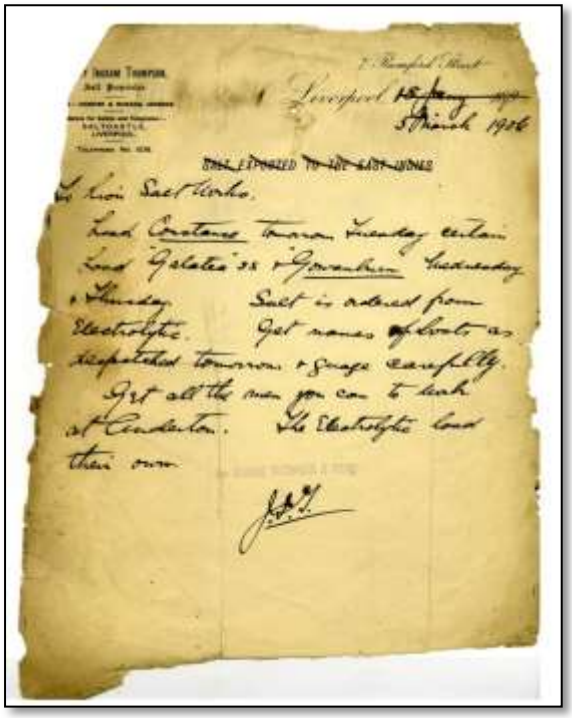


7.1: International Salt was exported worldwide from the Alliance and Lion Salt Works. In the 19th century it was to the East Indies. In the 20th century markets existed in the Americas, New York, Canada, and Puerto Barrios, British Honduras. New markets were found in Denmark and New Zealand. The main market was in West Africa in Sierra Leone, Liberia, and Nigeria.

The early-20th-century trade

By 1904, further difficulties were occurring with the Indian market. A great loss of revenue occurred due to the granting of low freight rates to salt works on the Red Sea that resulted in large supplies being sent to the Calcutta market. Export trade to the East Indies, for this year became unprofitable. [359] Production moved from markets aimed solely at India and became more diverse (see 7.1). Speaking in 1988 Henry Thompson recalled:

…after that [the Indian Market] *the emphasis moved from India to Canada and then, finally, from Canada to West Africa and that business commenced in the early 1920s and it continued up to the closure of the works in 1986.* [360]



7.2: An indication of the demise of the trade to India is shown on the early delivery notes that advertised 'salt exported to the East Indies'. This has been deliberately crossed out.

…the end of the Indian trade was brought about by a very high tariff being placed on the salt in Aden… [Arabian Peninsula] *… the end of the Canadian era was that they started to produce adequate supplies of salt of their own. And then the main market after that was, as I mentioned, West Africa* (7.2). [361]

Inklings of the early 20th-century Canadian trade are to be found in a ledger for the Sunbeam Works covering the years 1909–1915, [362] which records shipments to Montreal, Quebec and Halifax, Nova Scotia. The Montreal consignments went to the salt merchants Verret Stewart and Co., agents for the Salt Union, [363] and the Halifax consignments to Arthur N. Whitman, fish salt and fish oils. [364] The names of several ships are also detailed some of which formed part of the Manchester Liners Ltd fleet, a Manchester based company that sent ocean going liners along the Manchester Ship Canal, and which sailed principally to Canada and the USA. [365]

Jonathan Thompson speaking in 1988 recalled that the Canadian trade was unsuccessful because the Great Lakes and the St Lawrence would freeze over preventing shipping. By this time an alternative market had opened up and they got their salt from America. [366]

Detailed information on these early years of trade has been provided by a series of delivery notes dating from 1905 to 1910. These indicate the wide range of clients that bought salt produced by the Lion and Sunbeam Works.

Much of the salt was produced under the Ingram Thompson and Sons own brand name, as shown by a delivery note which gives specific instructions for marking:

Mark 4,800 L/W [Large White] *sacks, 24 x 38, INGRAM THOMPSON & SONS, 140 Lbs, see that the same mark is put on each sack without the slightest difference in size of Stencil, letters, or*

359 Calvert 1915, 510.
360 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
361 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
362 LSW NOCMS 1986 /3782/1/21.
363 Lovell's *Directory* 1828–1829.
364 Bard's and Co.'s *Directory* 1900.
365 Readily recognizable as all having names beginning 'Manchester'. The ones mentioned in the ledger are the Manchester Commerce, Manchester Imposter and Manchester Mariner.
366 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.

arrangement of letters, or in any particular. The marks must be exactly the same throughout. JIT[367]

Despite the near monopoly that the Salt Union had over the industry, they still continued to be a valuable client of the Thompsons who would market their salt through the Union:

…the bags are to be marked COMMON SALT, MANUFACTURED BY SALT UNION LTD, LIVERPOOL, and load the same by 4 0'Clock tomorrow into the SS 'Constance' as she has to be in Manchester with the salt on Thursday. [368]

The Salt Union also adopted the 'MONOPOL' Brand:

Referring to the 50 sacks you have just received from the S.U. [Salt Union] marked E [S] B SALINE, 75 Kilos, please put the Monopol brand just underneath the brand and fill with 164lbs sacks good weight best quality fine factory filled salt. To be loaded into the Constance tomorrow. Be very careful with this order and see that the salt is free from panscale and discolouration. JIT. [369]

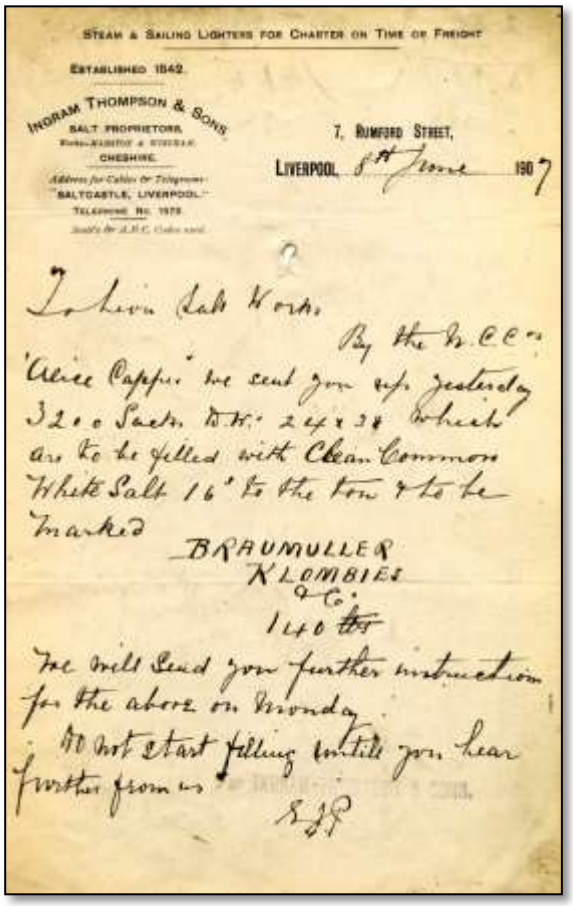
Please mark 180 white sacks (which you have at the works) MONOPOL LS UB and fill with fine factory filled salt, 12 sacks to the ton and load it in the Amelia (15 tons). [370]

The above order is very particular about the quality of the salt, and it indicates that the Salt Union were hard task masters and would clearly refuse below quality salt. The Salt Union themselves marketed for other companies, including those in the Indian Market:

You have received 200 hessian sacks 12" x 24" (19th Aug) from the Salt Union. Please mark these J M CHAMA and fill with 25 lbs each good quality best fishery salt and load in the Constance along with the factory filled salt. [371]

The other major client was a company called Braumuller Klombies and Co (7.3).

I trust you have now got the 4800 kw sacks 26 x 40 that they are being filled. The mark is 'BRAUMULLER KLOMBIES & CO, G & A 187'. Fill 12 sacks to the ton, good clean and dry salt, good weight. You must work all night on Friday until this order is completed as Gowanburn must leave on Saturday morning and the Constance must be finished on Saturday night. JIT. [372]


STEAM & SAILING LIGHTERS FOR CHARTER ON TIME OR FREIGHT

ESTABLISHED 1842.

INGRAM THOMPSON & SONS
SALT PROPRIETORS,
CHESHIRE.
"SALTCASTLE, LIVERPOOL."
TELEPHONE No. 1575

7, RUMFORD STREET,
LIVERPOOL, 8th June 1907

To Lion Salt Works.
By the S.S. "Alice Pappi" we send you esp. yesterday 3200 Sacks N.W. 24 x 38 which are to be filled with Clean Common White Salt 16" to the ton & to be marked
BRAUMULLER KLOMBIES & Co.
140 tons
We will send you further instruction for the above on Monday.
Do not start filling until you hear further from us.
R.J.P.

7.3: Delivery note for Braumuller Klombies and Co.

Braumuller Klombies and Co. appears to have been set up by two German émigrés in the 1880s. They are first recorded as aliens in 1886, as Ernest Gustaf Heinrich Reinhold Braumuller of 13 Euston Grove, Birkenhead, Cheshire who registered on the 11th November 1885 and Carl Robert Klombies of 68 Liverpool Road, Birkdale nr Southport, Liverpool, who registered on the 26th September 1885. Both originated in Germany. [373] The company was registered at 5 Chapel Street,

367 CRO D8645 LSW 90/229/126: Delivery Note, 23 October 1908.
368 CRO D8645 LSW 90/229/58: Delivery Note, 13 August 1907.
369 CRO D8645 LSW 90/229/6: Delivery Note, 14 August 1905.
370 CRO D8645 LSW 90/229/20: Delivery Note, 30 May 1906.
371 CRO D8645 LSW 90/229/116: Delivery Note, 26 August 1908.

372 CRO D8645 LSW 90/229/108: Delivery Note, 6 August 1908.
373 http://www.liverpoolhistoryprojects.co.uk/merseysidealiens/aliensname.htm#BAADER

Liverpool. It is not clear where they exported to. The German market was a possibility despite domestic production but the most likely destination is German colonies in Africa such as present day Cameroon. The company was wound up and put into liquidation during the First World War on the 22nd March 1917. [374]

The first indication of the African Market that dominated the 20th century is given in these early delivery notes, with both Nigeria and Sierra Leone clients:

Have the Lagos and Sierra Leone order for Constance down ready at Anderton in well sheeted boats and we will advise you when the above will be wanted. [375]

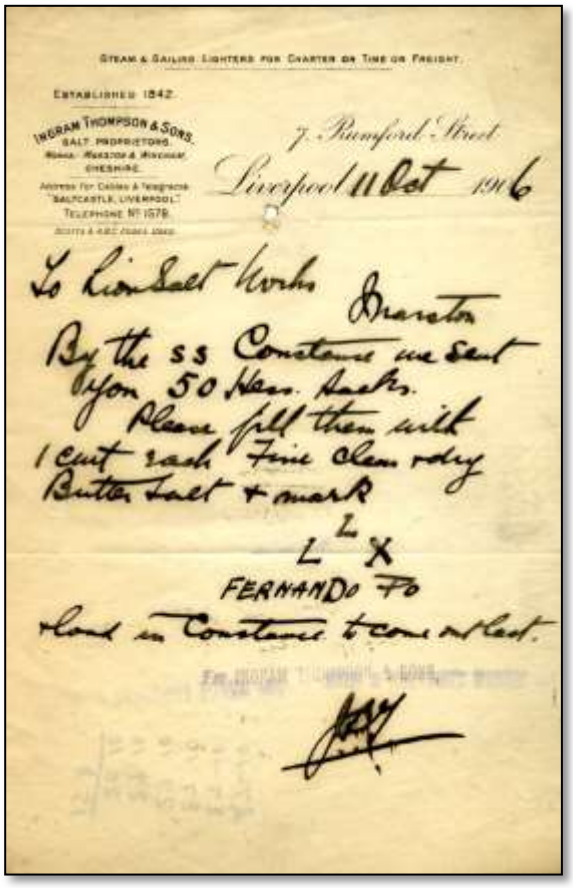
Although the majority of the salt was exported to mainland West Africa, to Nigeria, Sierra Leone and Liberia, the small island of Fernando Pó in Equatorial Guinea, now called Bioko, was also an export location. John Holt and Co. was the main company based here. John Holt went out to Fernando Po (Bioko in Equatorial Guinea) in 1862, established his own trading company there, and in 1897, with his two brothers, founded John Holt and Co. (Liverpool) Ltd.

By the SS Constance we sent you 50 … sacks. Please fill with fine clean and dry Butter salt and mark L L X FERNANDO Po and load in Constance to come out last (7.4). [376]

The first orders for Paterson Zochonis, the most important client in the mid-20th century (see below) can also be found in these early delivery notes.

Please load Constance with 1000 bags P Z LAGOS Factory Filled Salt and no common salt. We will telephone the time she will be at Anderton in the morning. [377]

Although business rivals, it was not uncommon to work with or for other local firms in order to fulfil orders. Seddon and Sons Ltd, Middlewich were one such company, who worked in both the international and domestic market. Towards the end of the 1890s, Henry Seddon purchased a salt works at Middlewich, which had been established in 1756. In 1907 Seddon incorporated his business into a limited company, Henry Seddons and Sons Limited, with offices in Pepper Street, Middlewich. [378]


STEAM & SAILING LIGHTERS FOR CHARTER ON TIME OR FREIGHT.

ESTABLISHED 1842.

INGRAM THOMPSON & SONS.
SALT PROPRIETORS.
NORTHWICH & WINSFORD
CHESHIRE.
Address for Cables & Telegrams
"SALTCASTLE, LIVERPOOL."
TELEPHONE No 1578.

7 Rumford Street
Liverpool 11 Oct 1906

To Lion Salt Works Brunner
By the SS Constance we sent
you 50 Hess. Sacks.
Please fill them with
1 Cwt each Fine Clean dry
Butter Salt & mark
L L X
FERNANDO PO
Load in Constance to come out last.

7.4: Delivery note for export of salt to Fernando Pó.

The Constance must be loaded with a full cargo good Seconds Fishery Salt immediately and must be down at the steamer 'Enriquette' in Weston Dock tomorrow Thursday night to put out 40 tons for the Salt Union ltd certain. The balance of her cargo 180 tons is for Seddon order, we have not yet got the name of the steamer but she will be there on Friday. [379]

Please send boats Duke and Earl to Seddon & Sons Ltd, Brook Lane Works for 24 tons of good, clean

374 *The London Gazette*, 3rd April 1917, 3255.
375 CRO D8645 LSW 90/229/124: Delivery Note, 5 October 1908.
376 CRO D8645 LSW 90/229/31: Delivery Note, 11 October 1906.
377 CRO D8645 LSW 90/229/145: Delivery Note, 9 August 1909.
378 Faulkner 1992, 54–59.
379 CRO D8645 LSW 90/229/45, Delivery Note, 15 May 1907.

and dry 7.7 salt, 80 sacks fine grained for Manchester. [380]

Another Middlewich company was Verdin Cooke and Co Ltd:

Please see that the Fishery Salt for 'Grimsby' is despatched first thing in the morning and let us have the numbers by telephone and oblige. Verdin Cooke & Co Ltd, Middlewich, Cheshire. [381]

The Verdins were prosperous salt manufacturers whose family firm, Joseph Verdin and Sons, rose rapidly during the boom years of 1860–1870. The Verdins were first shippers of white salt at Northwich in 1844 and salt manufacturers by 1850. By 1881, Robert Verdin, giving evidence before the select committee on the Brine Compensation Bill suggested they were the largest salt manufacturer in the world, producing 353,000 tonnes of salt a year with works at Marston, Witton, Moulton, Over, Wharton and Middlewich. The firm employed over 1,000 men. [382]

Closer to home, the split in the family business did not mean trade was not carried out with Alfred Jabez Thompson works in neighbouring Wincham:

….to A.J. Thompsons supplying for us 200 tons and to him 2400 sacks for which he has instructions about marking. [383]

Although a diverse business, the Thompsons were unable to supply all sorts of salt, and to this end sub-contracted salt from other firms. In particular a new salt produced by the Electrolytic Alkali process [384] could only be obtained from the company itself:

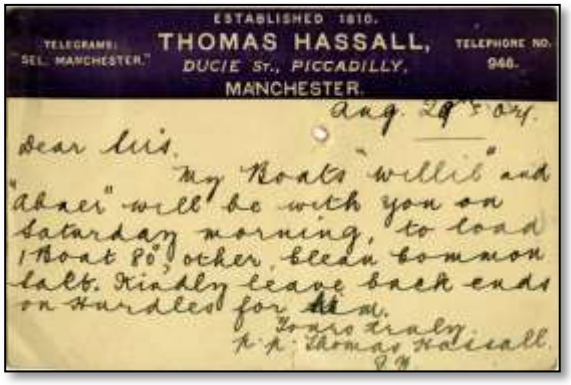
Send boats to the Electrolytic Alkali Company for 250 tons and load in Gowanburn as soon as you can. Load also in her the 50 tons 7.7 [salt] for Calabar and get Gowanburn finished as soon as possible. [385]

The Gowanburn will be at Anderton Friday morning first thing for 300 tons of Electrolytic Salt. [386]

As well as the international market the Thompsons served a small domestic market. The Manchester market was maintained by Thomas Hassall of Ducie Street, Piccadilly (7.5). The salt was delivered either by Hassall's own boats 'Willie' and 'Abel' or using another carrier, usually 'J Carrington':

Dear Sirs, I shall be at your works on Tuesday night. My order is to be 1 boat Dairy and 1 boat lumps or 2 boats lumps. If you cannot give us this I will take 1 common if you can save me fine common. J Carrington. [387]

Mr Stelfox, Messrs I Thompson and Sons, Lion Salt Works, Marston, Dear Sirs, Carrington will be at the works on Monday morning to load one boat dairy salt and one boat common salt. Please reserve me the Common from the lump pan. Thomas Hassall. [388]


ESTABLISHED 1810.
TELEGRAMS: "SEL. MANCHESTER."
THOMAS HASSALL,
DUCIE ST., PICCADILLY,
MANCHESTER.
TELEPHONE NO. 946.

Aug. 29th 04.

Dear Sirs.
My "Boats willie" and "abaer" will be with you on Saturday morning, to load 1 Boat 80 ocher, bleda common salt. Kindly leave back ends on hurdles for me.
Yours truly
p.p. Thomas Hassall

7.5: Delivery note for Thomas Hassall

The market was small and appeared to involve the delivery of two narrow boats of salt on a fortnightly or monthly basis. To this end, more lucrative international orders were prioritised and Thomas Hassall would be sent to other salt works:

380 CRO D8645 LSW 90/229/147: Delivery Note, 19 August 1909.
381 CRO D8645 LSW 90/229/51: 25 June 1907.
382 CRO D8645 LSW Mary Rochester Notes on the Verdin Family.
383 CRO D8645 LSW 90/ 229/98: 31 March 1908.
384 Anon 1902. 'Die Elektrochemie Alkali Company in Middlewich', *Zietschrift Fur Elektrochemie* **8**, 7th April 1902.
385 CRO D8645 LSW 90/229/105: Delivery Note, 18 June 1908.
386 CRO D8645 LSW 90/229/112: Delivery Note, 19 August 1908.
387 CRO D8645 LSW 90/229/80: Delivery Note, n.d.
388 CRO D8645 LSW 90/229/159: Delivery Note, 18 December 1909.

… Hassall's boats must go to Raynor and Howards for all Common Salt both boats. You must not load them with anything. … [389]

The Liverpool firm, Simmonds, Hunt and Montgomery, also received regular orders (7.6):

Simmonds, Hunt and Montgomery have sent you a supply of sacks for butter salt. Please fill them and despatch per wagon as soon as possible, clean and dry Butter Salt. [390]


Works: "ALBION" Mills, Boundary Street.
No. 2239
Office: PENWICK CHAMBERS.
PENWICK STREET.
Liverpool, Sept. 5th 1910
To Messrs. Ingram Thompson & Sons
Northwich
Please supply the following goods, viz.:
20 Tons Salt x Contract.
For SIMMONDS, HUNT & MONTGOMERY.
Limited

7.6: Delivery note for the Liverpool firm, Simmonds, Hunt and Montgomery.

The firm was founded in 1827 and was an animal feed manufacturer. It produced a milk substitute product 'Albion Calf Meal' and 'Albion Cakes'. [391]

Other orders were bound for the local domestic market in Cheshire:

To William Moore, Shropshire Union Canal Co, Banbridge, Nr. Nantwich, 25th February 1908, Please send one boat to our Lion Salt Works, Marston, Northwich, on North Stafford Canal for about 20 tons salt in back for Ellesmere, Shropshire, Lymeal Wharf. Rate 4s/ 2d per ton inclusive of all charges. Please send the boat immediately and if you will telephone our works 66 Northwich. They will load her on arrival. Yours Faithfully, Ingram Thompson & Sons. [392]

The mid-to-late 20th-century industry

Denmark

During the 1930s a significant trade was being done with Denmark, through the firm of O. S. Olesen and Co. of Copenhagen, partly, at least, for use in bacon curing. Danish ports to which Thompson's salt was shipped included Skive, Frederikshavn, Hobro, Randers, Arhus, Horsens and Fredericia on Jutland; Odense on Funen; Frederikssund, Copenhagen and Korsor on Zealand; and Nykobing Falster on Lolland.[393] Carriage of Thompson's salt from Liverpool to Denmark was mainly carried out by Danish shipping companies. One operator mentioned in the letters is the United Steamship Company (Det Forenede Dampskibs-Selskab), the principal Danish shipping line of the time.[394]

Quantities for the last eight years of the trade (the only ones for which we have some record) were as follows: **1932** (April-December) - 1,538 tons; **1933** - 3,390 tons; **1934** - 2,120 tons; **1935** - 1,760 tons; **1936**- 1,859 tons; **1937** – 2,675 tons; **1938** – 1,350 tons; **1939** – 1,220 tons. [395] John Ingram Thompson estimated that the total shipments of salt from Liverpool in each of the years 1932–1934 amounted to approximately 14,000 tons. [396] Thompson's share averaged 16%, reaching a

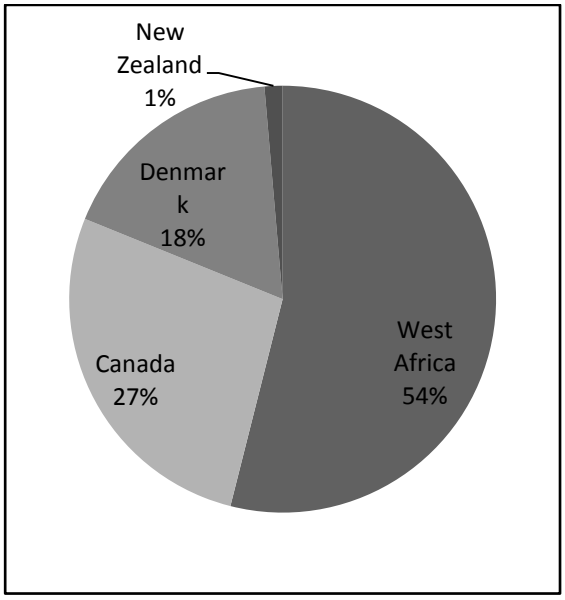
389 CRO D8645 LSW 90/229/125: Delivery Note, 9 October 1908.
390 CRO D8645 LSW 90/229/138: Delivery Note, 10 June 1909.
391 Various images of enamel signs bearing the 'Albion Trade Mark', e.g. Old Enamel Sign, Congresbury, North Somerset; A single postcard depicts 'Albion Cakes' at the Liverpool Showground *c.* 1910. www.oldpostcardimages.com, added 24th October 2011; A 'Sentil' tractor in the Liverpool Museum with Lievry, www.flickr.com/photos/brizzlebornandbred.

392 CRO D8645 LSW 90/229/88–89.
393 The evidence for this trade is based mainly on a volume of 'Foreign Letters' dating from between 1932 and 1952: LSW NOCMS 1986/3783/23.
394
395 LSW NOCMS 1986/3783/1/23.
396 LSW NOCMS 1986/3783/1/23, 453.

height of 25% in 1933, and over the entire 1932–1939 period averaged shipments of 1,987 tons per annum.

From 1932, and probably before, a number of complaints were received about the condition of the salt supplied to Denmark. [397] These were various in their nature: the salt was damp, had set hard, was dirty, had been contaminated with scale, or contained bacteria that had infected the bacon. The initial response from Thompson's was to consider that the complaints were ploys on the part of the end users to obtain discounts on the salt, on the grounds that the product was in good condition when it was loaded onto the ships, and that English bacon curers were entirely satisfied. As the complaints continued so did Thompson's attitude become less intransigent and there was an acceptance that the grievances of the customers about the condition of the salt might, in some cases, be justified. Efforts were made to get to the bottom of the problems, though the company never accepted that the fault might in some measure be with them. In Thompson's view culpability lay elsewhere: the salt had been contaminated by some outside agency: through poor handling during transport from Liverpool or by storage in unsuitable conditions in Denmark. Nevertheless, extra precautions were taken over the transport, and ships were inspected to make sure the conditions were suitable. [398] It is evident too that Thompson's quality control extended to the point of embarkation, when samples of the cargoes were taken for future reference.

Competition from other English salt manufacturers was a cause for concern, and Thompson's were advised by Oelsen's to lower their prices accordingly. Middlesbrough salt is mentioned as being cheaper than Thompson's because the freight costs were lower, but Thompson's did not feel able to lower their prices, on the grounds that Middlesbrough would reciprocate and still have lower freight costs. [399] Odense was a particularly difficult market for Thompson's, the hopelessness of the situation prompting them to reduce the price of their salt to this port only in order to have a chance of securing some orders there.[400] Generally, the salt trade with Denmark was experiencing difficulties in the 1930s as a result of the imposition of quotas on the import of Danish bacon to the UK, a move that had the reciprocal effect of limiting the amount of English salt that could be exported to Denmark.



7.7 In the 1930s there was a broader export market to a number of locations around the world. The figures above are based on the ledgers from the Lion Salt Works and suggest that the Thompsons were exporting *c.* 7,500 tons annually by 1938-1939. The West African market had begun to dominate and the Second World War brought the end to the other international markets.

1937 was a good year, but the last two years of the Denmark trade witnessed a decline in orders, a reversal that was remarked upon by Thompson's in a letter of July 1938: 'We do not seem to be receiving Orders to ship Salt to Denmark for anything like the quantity we ought to have, the tonnage is very low this year and we are well into July.' [401] The last shipment before the Second World War was made in August 1939. On the 5 April 1940, just before the German invasion of Denmark, a letter was sent asking for news after a long period of silence. There is no record of a response, and although contact was re-established with Olesen's after the War the management had changed and the trade does not seem to have been resumed.

397 LSW NOCMS: 1986/3783/1/23, 25, 284, 292,
398 LSW NOCMS: 1986/3783/1/23, 131.
399 LSW NOCMS: 1986/3783/1/23, 80, 213.

400 LSW NOCMS: 1986/3783/1/23,176.
401 LSW NOCMS: 1986/3783/1/23, 703.

Canada

Canada remained a moderately substantial market for Thompson's during the mid-20th century. Between 1937 and 1947, the years for which records survive, a regular Canadian trade was conducted through the firm of Andrews Gillespie and Company. Figures collated for the four years 1938–1941 give an idea of the scale of the trade at that particular point: **1938** – 2, 015 tons; **1939** – 1, 980 tons; **1940** - 1,425 tons; **1941** – 1,609 tons. Shipments were sent to Montreal, Quebec, and St John, New Brunswick, mainly via Manchester Liners Ltd, whose ships were being used by Thompsons some thirty years earlier. Andrews Gillespie disappears from the company records at the end of 1947, which may mark the end of Canada as a significant market for Thompson's.

New Zealand

A small export trade to New Zealand was carried out during the 1930s to 1950s through the firm of Swift and Co., a meat packaging company based in Sydney, Australia. The first contact seems to have been in June 1932 and the first purchase was made two years later. Shipments were made to Bluff, Dunedin and Timaru on the South Island, and to Auckland and Wellington on the North Island via a number of carriers including the Blue Funnel Line; the New Zealand Shipping Company; and the Shaw, Saville and Albion Line. The quantities, however, were never very large, reaching their height in 1941 and 1942 when 200 and 250 tons respectively were shipped. However, the size of these shipments was probably owed to wartime conditions and the unpredictability of supply. Usually, the annual total was fewer than 100 tons. Swift and Co. remained on the books until 1956.

West Africa

If the War put an end to the Danish market and the scale of the antipodean trade was disappointing, the West African market continued to flourish and its scale can be reconstructed in detail from the late 1930s onwards.

In the 1950s and 1960s the West African Market commanded 90% of the salt works output. Speaking in 1988 Henry Thompson suggested that diversification had been attempted:

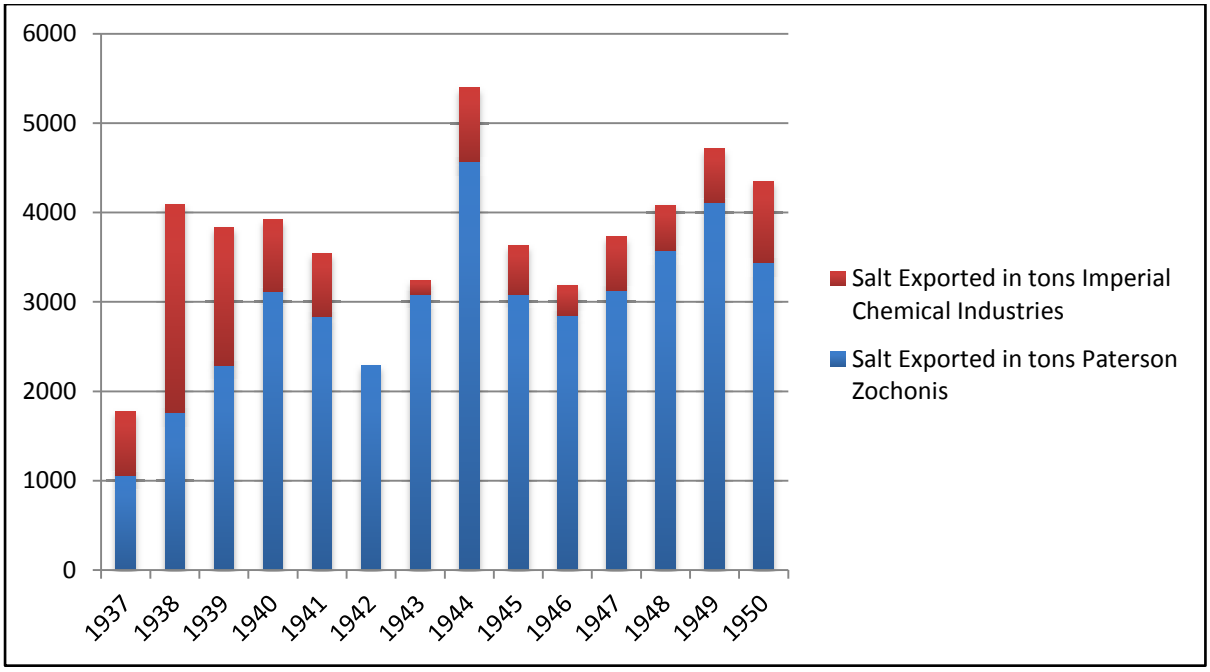
When I first started work [Authors note – 1947] I suppose it [the African Trade] represented 90% of what was produced, but in order to try and not have too many eggs in one basket, we reduced it to about 70% of the output. [402]

The West African market was run through a number of firms:

We dealt with three main merchants. Most of the business to West Africa was done through Paterson Zochonis. But, we also traded with John Holt and United Africa Company which is part of Unilever. …Paterson Zochonis were the main people and we also did, for very short periods some business with a company in Hamburg, but that wasn't a very successful venture. [403]

Paterson Zochonis was a Manchester based trading company originating in Sierra Leone and in the partnership of George Henry Paterson and George Basil Zochonis, both African traders who set up their business in 1879, later expanding into Liberia, Guinea, Nigeria and Cameroon. The company was incorporated in the UK in 1884 with an office in Liverpool, moving two years later to Manchester. Paterson Zochonis imported West African produce and exported British goods to West Africa, including Thompson's salt (see 7.9). The salt was sent from Liverpool to Nigeria (Apapa, Calabar, Port Harcourt), Sierra Leone (Duala and Sherbro), and Liberia (Monrovia). As a rule, West African shipments were made for Paterson Zochonis every month, and the quantities were substantial: **1937** (September–December) – 1,059 tons; **1938** – 1,765 tons; **1939** – 2,292 tons; **1940** – 3,111 tons; **1941** – 2,839 tons; **1942** – 2,292 tons; **1943** – 3,085 tons; **1944** – 4,574 tons; **1945** – 3,068 tons; **1946** - 2,848 tons; **1947** – 3,129 tons; **1948** – 3,577 tons; **1949** – 4,111 tons; **1950** - 3,440 tons (see 7.8 above).[404]

402 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
403 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
404 LSW NOCMS: 1986/3783/1/13.



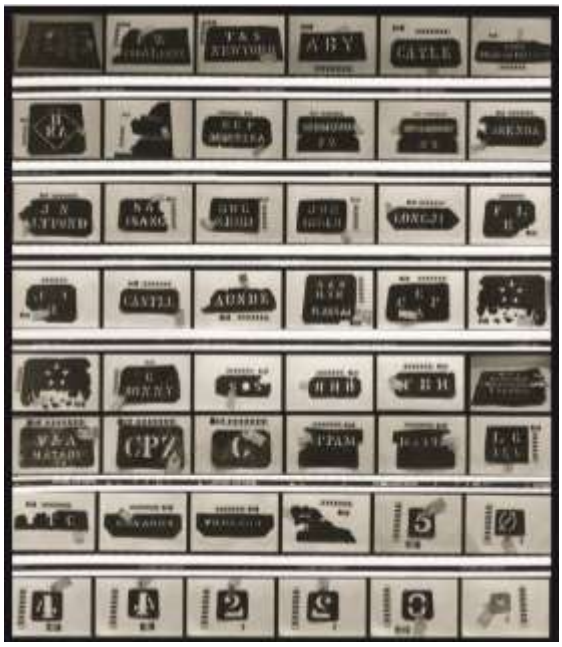
7.8: In the years before the Second World War the Salt Union was a significant customer. In 1937 they were acquired by Imperial Chemical Industries (ICI). Subsequent reorganisation saw them increasingly produce their own salt. After this the Thompson's began to trade with Paterson Zochonis. The figures above show annual salt export during and after the war, based on figures in the Thompson's ledgers (figures for 1937 represent four months only).

In contrast, John Holt and Co. and the United Africa Co. were more occasional customers, and on a much smaller scale. Like Paterson Zochonis both these organisations had their origins in West Africa. John Holt went out to Fernando Po (Bioko in Equatorial Guinea) in 1862, established his own trading company there, and in 1897, with his two brothers, founded John Holt and Co. (Liverpool) Ltd. The United Africa Co. had its roots in two African trading companies, both of which came under the control of Lever Brothers of Port Sunlight, and which were amalgamated in 1929. Both John Holt and Co. and the United Africa Co. had their own shipping fleets.

Another significant customer for Thompson's Light Lagos Salt for supply to West Africa in the late 1930s was the Salt Union. This trade was inherited by ICI when it absorbed the Salt Union in 1937, but the change of ownership was accompanied by a reduction in orders, possibly owing to a reorganisation of production on the part of ICI following the takeover. The figures are as follows:- **1937** (September–December) – 711 tons; **1938** – 2,327 tons; **1939** – 1,537 tons; **1940** – 813 tons; **1941** – 703 tons; 1**943** – 157 tons; **1944** – 825 tons; **1945** – 544 tons; **1946** – 339 tons; **1947** – 605 tons; **1948** – 507 tons; **1949** – 604 tons; **1950** – 910 tons. Shipments were to Liberia (Monrovia), Nigeria (Apapa, Calabar, Ibadan, Port Harcourt) and Sierra Leone (Duala, Freetown) (see 7.8 above).

7.9: These salt bags were recovered from Stove House 3 and 4 during restoration work. The colours had been preserved by the salt in which they were covered. They all come from the firm Paterson Zochonis. They used distinct motifs as opposed to text as the salt was generally sold to a semi-literate society at the time.

Jonathan Thompson mentions another firm, G B Ollivant. [405] They were a Nigerian shipping company until their acquisition by the United West African Company in 1973.



7.10: Bags were marked with stencils as part of the packing process. They show the varied locations to which salt was exported in the 20th century including New York and Africa namely: Conakry ([Conikiri], Guinea), Sierra Leone, Bonny (Island, Nigeria), Kribi (Cameroon), Cabenda ([Cabinda], Angola) and Matadi (Congo). Others were names of ships (e.g. SS Appam).

The main shipping line used by the Thompsons for the West African market in the 1940s was the Birkenhead based African Steamship Co., founded in 1852 by the African explorer, Macgregor Laird, and later part of the Elder Dempster group. However, several other lines were also used, amongst which were the Blue Funnel Line, the John Holt Line, the Silver Line, the United Africa Co. and the Bank Line.

The Thompsons attempted to diversify the trade throughout the later 20th century. This was only partially successful so that by 1986 70% of the market was still destined for West Africa, particularly Nigeria. The home market was described by Henry Thompson:

I think I mentioned that 70% of the output was for West Africa and 30% was other. Well perhaps I should say just a little about the 30%. That was largely for the home market, the blocks, the big blocks of salt were cut up into smaller blocks, measuring about seven inches by three and a half inches square and those were called cut lumps. They were actually cut, they were sawn up by circular saws into these smaller sections and we wrapped them in either waxed paper or little plastic bags and this was sold on a line roughly from south of The Wash. If you take a line from The Wash across to say Liverpool, anywhere south of that line we regarded as cut lump country and the sore of the market was, in fact, South Wales. That was where we sold the most and along the south coast. The only reason I can really think of is that north of that line they were not so discerning as north of it (chuckling). That market accounted for 27% of the 30, and the other 35 involved a little salt to the Low Countries and a little bit to the Middle East and that's how we divided it up, until I retired. [406]

Jonathan Thompson suggested that when he first came into the business (in the 1960s), they were selling block salt to other companies. By the later 1960s they started their own brand. They also sold to health food stores. Jonathan Thompson opened up new markets to Scandinavia, Ireland and Holland. [407]

One of the main sources of competition throughout the 1960s and 1970s was from Vacuum Salt producers. Few open-pan salt works remained in business. The exceptions were Henry Seddon, British Soda (who also did vacuum) and Palmer Mann. Cerebos took over the long running Middlewich firm of Henry Seddon and Sons Ltd and closed it down. [408] The remainder had closed by the 1970s with the result that the Thompsons retained the only salt works using the open-pan technique. In 1968, the British Salt works plant (now TATA), opened in Middlewich. It was a huge new vacuum salt plant. Henry Thompson recalled that the 1970s were a period of economic difficulty:

405 CRO D8645 LSW Jonathan Thompson oral history transcript (2) *c.* 1989.

406 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

407 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.

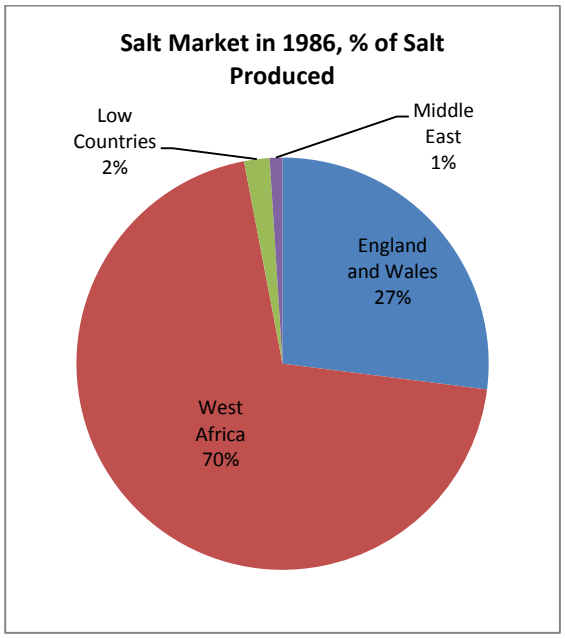
408 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.

There was competition in the trade. Principally, I suppose, from the Vacuum Salt Producers. But we could never really compete because time went on and we got into the early 1970s and money was, as far as the home market was concerned, much tighter and it was difficult to sell open pan salt on the home market. People were much more cost conscious. [409]

The eventual closure was, however, as a result of reliance on one particular market. Henry Thompson described the state of the Nigerian market:

But we were not able to get it any lower than that [70% of the market] *and that was the reason that the works finally closed that we still had too many eggs in one basket and, unfortunately, there was nothing we could do about it. Also the other reason that it collapsed was that the economy of Nigeria was in tatters and still is and they simply hadn't got any money to buy salt and I suppose, over a forty year period, the first twenty years of my working life were the best. Nigeria then was under British administration and everything ran like clockwork and then they got their independence and there was a slow deterioration from that time and things got more and more difficult.* [410]

…Without doubt [the final nail in the coffin was] the difficulty of selling salt to Nigeria… …That still involved about 70% of our output and we couldn't produce salt for the home market without a certain amount of cut-off, as it's called, salt which had to be disposed of. What I'm saying is that, in order to produce cut lump salt you cut up a large block of salt and because the big block is tapered and you have to parallel the sides you get off-cut and the amount is quite considerable and there has to be a market to dispose of this and at the end there simply, the market just didn't exist and we finally decided that the time had come when we had to give it up. We just could not operate any longer. So I have been retired about two and a half years now and I've had no regrets at having to give it up after it being in the family 260 years but I am, at least, satisfied that we took it as far as we could and made a graceful exit at the right time. Because I've since heard the West African market has deteriorated even further and is very nearly unworkable. [411]



7.11: Lion Salt Works, Production Markets in 1986

After the end of the Second World War colonies in Africa began to slowly gain independence from the United Kingdom and France. This resulted in many of the West African states that dominated the salt export market gaining autonomy. This included Ghana in 1957, Cameroon, the Ivory Coast and Nigeria in 1960 and Sierra Leone in 1961.

In Nigeria, from 1960 Prime Minister Abubakar Tafawa Balewa led a coalition government. The country fell into civil war between 1967 and 1970. The Nigerian Civil War known as the Biafran War, (6th July 1967 – 15th January 1970), was an ethnic and political conflict. Tensions between mostly Igbo people of the south-eastern province of Biafra and the Hausas of the north resulted in the civil conflict and the estimated death of a million civilians from famine and fighting. [412] This resulted in a military junta that lasted until 1979 when democratic elections were conducted. In 1983 a second military junta was installed when a bloodless coup brought about the dictatorship of

409 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
410 D8645 LSW Henry Thompson, oral history transcript, 1988.
411 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
412 Madiebo, A 1980

Muhammadu Buhari. Buhari ruled for two years, until 1985, when he was overthrown by General Ibrahim Babangida. The second junta lasted until 1999 when the country returned once more to democracy. [413] However, other states in West Africa were more politically stable in the 1960s, 1970s and 1980s. An exception is the Ndogboyosoi (or bush devil) war in 1982 in Sierra Leone.

The end of the Lion Salt Works cannot be seen as a direct result of the civil war in Nigeria. It is almost certain that trade to cities in the south-east of the country such as Port Harcourt and Calibar were disrupted in the 1960s. However, the unstable situation that followed the war and the ensuing military juntas are more likely to have been factors in disrupted trade links.

The decline in production at the Lion Salt Works visible from the late 1960s until closure must reflect the unstable political situation in Nigeria. But Jonathan Thompson, speaking in 1989, suggested far more prosaic economic reasons may have had a significant contributing factor. The Nigerians didn't like the dendritic quality of vacuum salt but it was much cheaper, retailing at £20/ per tonne in comparison with £90/ tonne for Open Pan salt in 1986. However, salt began to be imported into the Nigerian market from Brazil in exchange for oil (from Nigeria). The Brazilian salt supply was not dendritic and was produced using traditional techniques including solar evaporation. The salt was much cheaper than the Thompsons' open pan salt and of a better quality than the dendritic salt and may have in fact been as much of a contributing factor. [414]

7.12: The Thompsons developed their own brand salt throughout the 1960s and 1970s. This included cut lump salt and coarse salt. The bags were marked with Jonathon Thompson's distinct marketing:

Thompson's Coarse Salt is produced by the slow evaporation of Natural Cheshire Brine, completely free from chemicals or artificial additives, a superb table salt from an open salt cellar, ideal for cooking, preserving vegetables (especially runner beans) and curing meat, for salt baths, for water softeners. A regeneration salt for automatic dishwashing machines, refill pack for our coarse salt kitchen jars.

By the early 1980s the Thompsons had begun to open the site as working museum of the salt industry. Jonathan Thompson realised the tourist potential of the salt works. The Red Lion Inn was used as a small shop and tea room for visitors. Jonathan had his offices in the Red Lion Inn, downstairs on the southern side. [415] The tourists were shown round the working salt pans. Around 12,000 visitors came in the first year (1980) and from then on averaged 17,000 visitors a year. The Thompsons hired a former Industrial Chemical Industries (ICI) worker to help on tours. [416]

413 Siollun, M 2013
413 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.
414 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.
415 CRO D8645 LSW Jonathan Thompson, pers comm., February 2014.
416 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.

8. RUNNING THE SALT WORKS

Calvert's studies of the salt industry are traditional historical studies. [417] However, two excellent studies of the working life within salt works exist to date. The 19th-century salt industry was examined in detail by Brian Didsbury based predominantly on the reports of Joseph Dickinson, Mines Inspector but also made use of a series of other sources. [418] The second of these studies concerns the 20th-century industry. It is an oral historical record of one of the last salt workers and river men, Tom Lightfoot, recorded in the 1970s under the encouragement of Lady Mary Rochester and George Twigg, and finally published in 2000 by the Lion Salt Works Trust. [419]

These and other secondary sources provide a useful background to understanding how the Alliance and Lion Salt works functioned. In addition, the oral historical accounts of the Thompsons, former workers and visitors, business accounts and letters have been combined with new primary research within the archives to create an overall impression of the working life of the salt works.

Running the Salt Works: The Buildings

The buildings of the Cheshire open pan salt works are distinctive. Their construction is part design and part development, but development in the vernacular sense, where innovation was slow, and influenced by the passing of information from one generation to the next over many decades. Each building type represents a stage in the salt-making process.

The buildings of the Lion Salt Works are very much like other buildings in the salt industry, but display the character and nuances of the Thompson family.

In understanding how they were built two sources of information are useful: the memoirs of Tom Lightfoot and a series of specifications for the Sunbeam Works pans produced by Henry Ingram Thompson in 1895.

Four distinct processes have created the buildings of an open-pan salt works:

- Brine Extraction – Pumping, storage and distribution around the site
- Evaporating the Salt – the pans, pan houses and associated structures
- Drying the Salt – the stove houses
- Storing and Packing the Salt – the warehouses and associated machinery

In addition to these, a series of ancillary buildings and facilities have developed, no less necessary, but designed to support the salt works. These include:

- Manager's Offices
- Smithy, Joiner's Shop
- Canal Basins
- Railway Sheds and Sidings

Salt-making: Brine Extraction

In order to make salt you need the raw product, which was extracted from the ground via a brine shaft or bore hole, and raised by means of a pump, though often the pressure of the underground stream would often be strong enough to lift the brine on its own. On the site at the Lion Salt Works we have a number of buildings associated with brine extraction.

- Originally there was a brine shaft with a headstock.
- This was replaced by a nodding donkey and pump.
- The brine passed around the site in pipes.
- Finally the brine was stored in the brine tank.

The process is explained simply by Henry Thompson in 1988:

The surface water percolates down through the ground and it takes about seven years, for today's rain to get down there…and a bore hole was put down and brine was pumped up and it wasn't treated in any way. It contained about 98% sodium chloride in solution plus another one point and a

417 Calvert 1913 and 1915.
418 Didsbury 1977.
419 Fielding 2000.

bit trace elements, and it was then pumped into a large reservoir or tank which held, well, in our case, about 100,000 gallons, and then fed by gravity to the pans on the site. [420]

The literature only touches on brine extraction in passing, and the reality is that the standing structures of the Lion Salt Works represent some of the best examples of the remaining buildings associated with brine extraction.

The shaft was excavated by hand and dug to bedrock. The example from the Lion Salt Works is described in the gazetteer:

…a large and a very well-constructed brine shaft 8 feet square and 46 yards deep, well timbered and puddled with two sets of pump trees and old pumps. [421]

The shaft was dug through the drift geology and bedrock to the upper salt layer. The upper part was clay puddled and lined with timber as discussed above. The pump trees were large ferrous metal pipes designed to house the pumping mechanism and pump rods. By the middle of the 20th century the brine shaft, due to the advent of better drilling technology had been replaced by boreholes. These were bored up to 300 feet (90m) into the ground to the brine stream below. [422] They were lined with metal casing to the level of the brine stream. The brine was raised to the surface by a combination of artesian pressure and a steam-driven pump.

The pump was normally a beam pump driven by a horizontal stationary steam engine. This would be housed in a building specifically for the purpose known as a pump house. These were brick-built pitched roof structures that housed the boiler, steam engine and the pump with a gap for the beam to pass out of the building.

In the 18th and 19th centuries the brine would be directly pumped out of the ground and stored on site in a large wooden or metal brine tank. These brine tank would be housed on brick stands to make them at a higher level than the pans located on site, thus allowing the pans to be fed by gravity.

The Brine Tank at the Lion Salt Works is unusual in that it rests directly on top of the Engine House. The gazetteer of the works described this in 1899:

The above machinery is contained in a well-built brick engine house with a large iron brine cistern on the top 33 x 22 x 7 feet, with a capacity of about 3,000 gallons, well stayed across and supported under. [423]

Three note books kept initially in the spidery hand-writing of Alan Kinsey Thompson, and then by his son Henry Lloyd Thompson give a more personal insight into the art of brine pumping. [424] It was not simply a matter of sticking a hole in the ground and out, hey presto, pops the brine. It was subject to the fluctuating whims of mistress 'Roaring Meg', the underwater brine stream that flowed across the top bed of salt.

The original shaft south of the Engine House at the Lion Salt Works was eight feet by eight feet in size. It was timber lined at the top, but it was not clear how the lower part was constructed. Alan Kinsey's notebook records that '*Thomas Moore told me that Brunner Mond and Co had arranged their shaft at the bottom with the round part made of blue brick and 2ft of concrete*. *… When they had nearly everything ready the brine and water broke in and squirted through the timbers and blue bricks and concrete (same as a fairy fountain) and filled their shaft with brine'*. It seems likely that at the Lion Salt Works a simple timber construction was used throughout.

At the Lion Shaft at Marston, the top of the brine was located at a depth of 48 yards, 2 feet, 6 inch or 146 feet 6 inch. In comparison the Sunbeam borehole in Wincham was, 65 yards or 195 feet to rock head. The variation in depth reflected the overlying depth of marls and the narrowing of the salt bed. The deposits in Marston lay closer to the centre of the salt basin, and further down the natural slope from those in Wincham that lay on

420 CRO D8645 LSW Henry Thompson, transcript, 1988.
421 CRO D8645 LSW 90/412/202.
422 Fielding 2000, 6.

423 CRO D8645 LSW 412/202.
424 West Cheshire Museums (not accessioned) Diaries (x3) of Alan Kinsey 1905-1937 and Henry Lloyd Thompson 1937-1965

higher ground where the salt bed was becoming narrower.

The shaft had two boreholes located within the shaft. The boreholes went down through a series of two large cast-iron pipes called the pump trees and a series of bore-hole casings known as the rising main. A pair of pumps operated down the two boreholes. This is similar to the design of the Murgatroyd's Pump in Middlewich.

Above the brine shaft or borehole was a timber frame or structure known as the 'headstock' or 'gallows'. [425] This had four corner posts with a lattice work of timber between, designed to allow pump rods and elements of the lining to be lifted from the borehole or brine shaft.

The pump would operate at its peak at around 15-18 strokes per minute, or one every 3-4 seconds. A series of inter-connected rods descended down the borehole, where they attached to a 'leather' or 'piston bucket'. This was a bucket like device that drew the column of brine to the surface. No-return valves prevented the brine from flowing back down the borehole. At peak capacity the borehole would produce about 35,000 to 40,000 gallons a day, and up to 2,000 + gallons an hour. But the pumps were temperamental. They would run for several hours then cease and it was more common to see 500-1,000 gallons extracted in an hour.

The brine would be emptied into the cisterns which constantly kept the pans filled up with brine (see 8.1). Originally this appears to have been emptied into a large cemented cistern at the Lion Salt Works. A similar one would have been located at the Sunbeam Works. The cistern at the Lion Salt Works was not on site, and a similar cistern was located in the field east of the Lion Salt Works. In contrast the Brine Tank appears to have only had sufficient capacity for 1-2 days pumping around 30,000 to 40,000 gallons and could therefore not guarantee the supply to the pans. The supply in the Brine Tank had to be constantly kept topped up. When running well the borehole at the Lion Salt Works would keep the three stove pans and four fishery pans going, present in the early decades of the 20th century. But two entries for 1913 show what could happen if levels declined. On 11th April 1913, the Lion Salt Works had lost one foot in cistern in five days but was still feeding three stoves and two fishery pans. Five days later it was only just keeping three stove pans going.

8.1: An example brine cistern survives from the British Salt Works in Anderton. It is now a fishing pond in the Northwich Woodlands.

It was, therefore, a constant battle to keep the pumps operating as long as possible. Mechanical issues caused the pump to slow and develop a booming 'knock'. This could be the result of air in the bore-hole or clay and metal getting around the blast holes and choking the pump. Pieces of wood could block the bore-hole and damage the pumping equipment. After a bad 'knock' the engine would be slowed up for three or four strokes of the pump. If this persisted the whole operation would stop and they would have to draw the rods, or even the tube around the bore-hole.

Another issue was the 'leather' would be worn out, causing the pump to jerk and would have to be replaced. A 'leather' might last a few months or several years. A home-made 'leather' produced by the Thompson's lasted less than six weeks on 6th December 1909.

The quality of the brine was also an issue. The brine could come up muddy or with a lot of red scum. This would have to be allowed to settle out as it could affect the quality of the salt produced in the pans. On the 21st November 1910, Alan Kinsey complains: '*Our brine at Marston has fallen to about eleven feet* [above the rock head] *and does not work well it keeps setting over* [forming a scum that prevents salt crystals forming in the pan]. *I*

425 Fielding 2000, 6.

think it is owing to the dirty canal water getting into Newman's Hole'.

Test were undertaken to measure the quality of the brine. The 'twaddle', measured the amount of salt in solution within the brine. The measurements indicated that the brine in Marston had a twaddle of 40. At times it rose as high as 42. The 'twaddle' was critical to the efficiency of production, as a higher twaddle meant that there was more salt in solution and therefore, less energy would be required to produce salt. Over-pumping might reduce the twaddle, as would flushing water down the borehole, a trick of less scrupulous brine pumpers.

The brine stream was under considerable artesian pressure, sufficient to cause it to rise up the boreholes and sit at a depth of 45 feet from the surface, with over 100 feet of brine within the borehole. However, the pressure was temperamental and subject to fluctuation. Alan Kinsey Thompson refers to this as the 'Brine Flush'. Journal entries suggest that a rise in the level of the brine in one shaft in Marston, such as the Salt Union's Albert Shaft might take anything up to a week to reach the Lion Salt Works.

Alan Kinsey would note the level of the water in the flashes on an almost daily basis. Through his agent, Stelfox and his brine pumper, Cummerford he exchanged information with other salt manufacturers: Brunner Mond, the Salt Union and their neighbours in Wincham, Alfred Jabez Thompson and Raynor and Howard. They exchanged information about the height and quality of brine in their shafts. He could therefore predict when the 'brine flush' might arrive.

The temperamental nature of the 'brine flush' appears to have been effected by natural factors such as rainfall and natural groundwater levels. However, man-made issues appear to have been far more influential. The catastrophic subsidence clearly affected brine levels. The diaries for the years 1908-1914 are a lament of catastrophic subsidence in the area south of Marston: Neumann's Hole, Clough's Hole, Blackburn's Hole and Williamson's Hole.

South of Marston, by the 5th January 1913 the land was sinking very rapidly around the Witch and Devil Hotel (actually known as Townshend's Arms). By April 1914 the area along the Warrington Road across Clough's Hole was subsiding rapidly. Alan Kinsey Thompson complained: '*All the road is cracked from nearly Heath's Lane to Platt's Hill gateway. It is very bad and is going down very rapidly. Is in the same area everything is tumbling to pieces there are several cracks in the land 3-4 feet wide and the hole went in … and water poured down for an hour or more*'. The Witch and Devil was abandoned on 5th July 1913.

The land was perforated by countless bore-holes and brine shafts that allowed the water to empty directly into the mines below. Alan Kinsey complains: '*Water is running into Old Ben's Hole from both sides and water in the hole is not rising. This must be keeping the bottom mines fed at present*'. The Salt Union continued to extract 'bastard brine' from the bottom bed mines until at least 1911. Alan Kinsey recorded the Salt Union had tapped brine from their new shaft to Gibson's Pit, just south of Marston:

'*Their men say that Clough's Hole (which is Brody and Elson's Mine) is a top and bottom mine and they say that Gibson and Clough's is all connected and when they commence pumping there is bound to be a lot of sinking between them and Cranage Brook to the east and west. I saw air bubbling up through the water in Clough's Hole about 10 days ago, it may have been caused by the starting in Salt Union tunnel if all the old workings are connected*'.

The extraction of brine was at a phenomenal rate. Alan Kinsey suggested that on the 12th February 1912, the Coronation Shaft alone had sent about 20,000 gallons an hour down the pipeline to the Salt Union's vacuum evaporation works at Weston Point. Extraction resulted in fluctuations in the natural water table that affected the level of the brine stream over the upper bed of salt. There are constant references to the level of the water in both Neumann's and Clough's Hole being reduced. The Thompson's would have walked past these on their way from Northwich Station to the site every day. A diary entry from the 2nd February 1912

suggested that Blackburn's little pit shafts were visible with water running down the easterly one, at a level about 60 feet below the surface of the fields. The Salt Union's response was to flood the hole with water from the Marbury Brook eight days later.

There are no records for the 1930s but it must be the case that the collapse of the Adelaide Mine, north of the Lion Salt Works and the subsequent, depressing of the land to form the flashes must have affected the flow of brine over the wet rock head. The brine probably followed the natural slope, north-south towards the River Weaver. The gradual inclination of the sub-strata towards the mine would have caused the stream to slowly reverse, reducing the flow or eventually causing it to cease altogether. For this reason the Alan Kinsey decided to establish a new bore-hole at the southern end of the site.

The final journal gives a detailed account of the construction of the new bore-hole from 1937 to 1938. On the 21st June 1937, Samuel Timmins arrived at the Lion Salt Works to start boring. They erected a tower 45 feet high and started boring operations on the 5th July 1937. It took them until the end of July to bore through more than 120 feet of marl to just above the wet rock head. They inserted the rising main, firstly a 13 inch tube, narrowing to an 8½ inch tube after about 100 feet. They cemented the exterior of the borehole to a height of about 22 feet above the rock head.

Between January and March 1938 they proceeded to build the concrete base, assemble the steam engine, and align the pump. They steamed the engine for the first time in the first week in April. Then on April 12th 1938 at 11.55am they started pumping. Alan Kinsey exclaims: '*Went off first class and works beautifully*'. But this initial elation was short lived. The pipes were tight on the rock head and not pumping well. A short entry on the 17-18th April 1938 reveals Alan Kinsey's state of mind: '*Pumping, Easter Mon, Very Worried, Patience*'. He had invested considerable money in the new borehole and it may not have produced brine. By the end of the week the pump was working. Alan Kinsey reveals: '*Pumping well 10-11 strokes per minute, Plentiful Supply!!!! Tests 40 Twaddle, Clear, Everything working beautifully*'. Tests revealed the quality of the brine reached as high as 42 Twaddle, with a temperature of 61½° Fahrenheit.

Tests on the composition of the brine were undertaken on a regular basis using scientific analysis by a company based in Northwich.

Date	**June 1906**	**29th Oct 1909**	**3rd Nov 1909**
Appearance	Clear	Clear	Clear
Twaddell @ 15°C	40.9	41.0	40.2
Grms per 100cc of …			
Lime	0.204	0.330	0.329
Magnesia	0.059	0.02y	0.02y
Sulphuric Acid	0.389	0.229	0.230
Chlorine	18.638	18.6y3	18.y44
Calcium Bicarbonate	0.011	0.015	0.162
Calcium Sulphate	0.486	0.3896	0.391
Calcium Chloride	Nil	0.32y1	0.3291
Magnesium Chloride	0.01y	0.064	0.064
Magnesium Sulphate	0.0155	Nil	Nil
Sodium Chloride	30.694	30.42	30.469
Sodium Sulphate	Nil	Nil	Nil

Table 8.1: Bore Hole Red Lion Salt Works Marston

The beam pump in the case of the Lion Salt Works used a bell-crank mechanism, connected to a series of rods that passed down the borehole (8.2). Norman Eaton describes the 'Nodding Donkey', the colloquial name for the Lion Salt Works pump:

…I remember walking one day up the passage into the works and Mr Thompson was oiling the old donkey engine/ pump which drew up the nowadays notorious wild brine. He told me the old engine had never once let the family down in over 100 years, since the works was built. It had been stopped occasionally for essential maintenance but had never once 'gone down on its knees' in that

time. [426] *I mentioned the old donkey engine (it had a long shaft which went up and down, day in, day out)… …Mr Thompson meant it when he said it had never stopped, each succeeding Thompson, being on his honour from young to maintain it so it wouldn't. They were like that in those days.* [427]

8.2: The beam pump at the Lion Salt Works was known as the Nodding Donkey.

Above the borehole was a bi-pedal tower that incorporated two masts of a Weaver Flat, in its design, tethered by guy ropes. This structure was referred to as the 'derrick' [428] and allowed the pump rods to be raised.

The borehole worked well for the next 25 years. In 1959 Henry Lloyd Thompson drew the brine rods and noted the 'old leather' was hardly worn, before fitting a new one. He recorded the brine was at 45 feet from the surface, much higher than the levels in the first half of the century, and giving a 100 feet of brine in the shaft. In 1965 new tubes were fitted to the borehole by Samuel Timmins and the brine supply continued to be good quality of 40 twaddle. The old brine delivery pipes were dismantled and re-routed round No 5 Stove.

8.3: The brine pipes exiting the Nodding Donkey borehole and passing to the brine tank. The upstanding pipe was a surge pipe designed to prevent 'knocking' in the bore-hole by releasing pressure.

Despite this a new bore-hole was excavated in 1965 adjacent to the old brine shaft. No records exist of this sinking, but the pipework was removed and replaced in 1985 and replaced by Wyatt's of Whitchurch. It was a much smaller rising main of only two inches diameter and was drawn by an electrical submersible pump. The brine in this location continued to be strong with a twaddle of 42. Henry Lloyd Thompson suggested that the brine was pumped out of the ground at a rate of 3,000 gallons per hour by the end of the works a vast improvement on the earlier pumps. It took 900 gallons of brine at the Lion Salt Works to produce 1 ton of salt. [429]

426 CRO D8645 LSW Norman Eaton, oral history transcript, 1989.
427 CRO D8645 LSW Norman Eaton, oral history transcript, 1989.
428 CRO D8645 LSW Alfred Bentley Johnson, oral history transcript, *c.* 1989.

429 Thompson n. d. (*c.* 1985), 10.

Brine was distributed from the cistern and tanks to the pans under gravity. This not only saved on fuel, but avoided the use of smaller subsidiary pumps that would quickly corrode due to the effects of salt. The flow of brine was controlled by a series of taps at the brine tank, but also at the pan.

Salt-making: evaporating the salt

Open pan salt making produces a variety of grades of salt (discussed in greater detail below). These grades can be broadly grouped into two types of salt:

- Fine- or lump salt
- Common salt

They were produced in roughly the same way but using slightly different facilities.

Fine Pans

The fine-grained or lump salt was made in smaller pans. There would be a pan with a furnace, but in an enclosed shed known as a pan house. This would be directly connected to an adjacent stove house. The Lion Salt Works had five pan houses in the 1980s (numbered 1–5).

- Pan House 1 was demolished in the 1980s before the works closed in 1986 and is now a garden.
- Pan House 2 has largely fallen down but the pan and stove survive.
- Pan House 3 and 4 survive intact and have been restored.
- Pan House 5 was dismantled in 2009.

The salt would be made into lumps prior to drying in the stove house (see below), and was called lump or stoved salt.

Butter, Common or Fishery Pans

Coarse-grained salt was made in the open or very simple structures, the much larger Butter, Common or Fishery pans. No common pans now exist on the Lion Salt Works site the last was demolished and replaced by Stove House 4 in the 1950s. The Sunbeam Works continued to have five common pans until the 1970s (8.4).

8.4: The common pans at the Sunbeam Works, Wincham.

Each unit consisted of a large pan, with a furnace underneath, and wooden walkways or hurdles either side, a series of up to five or six pans would be served by a single chimney. Common salt would not be dried in the same way, but would be merely stored on the hurdles to dry, before being taken away to the salt warehouses. The salt was known as common, fishery or unstoved salt.

The Pan

The pans were made of ferrous metal – namely wrought iron and, by the 20th-century, mild steel. These pans were not built of a single piece of metal but instead were formed of several plates of metal riveted and welded together. When a leak sprung in the pan the panels could be replaced easily. This meant the pans became a patchwork of old and new metal (8.5). Henry Thompson described the pans at the Lion Salt Works:

A salt pan, average length is about 35 feet and about 25 feet wide and about 18 inches deep and it holds round about 6000–7000 gallons. [430]

A series of specifications for butter or common salt pans at the Sunbeam Works were produced for Henry Ingram Thompson in 1895. These give a specific indication of how salt pans were built and produced.

Pans to be 65'0" long x 26'0" wide x 2'0" deep. Rims to be of brown iron ½" and to splay out 3" all round. Angles to be of steel 3" x 3" x 7/16" to be obtuse to same angle as rims. Marginal plates on

430 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

bottom to be ⅜" thick, 1'6" wide down sides and across back end and 2'6" wide across front end. The bottoms of pans to be 5/16" thick for 14'0" from edge of marginal plate at front end, the remainder of back end of pans to be ¼" thick. The whole of pan bottom to be of Siemens Martin Steel. The rims and angles to be riveted with ¾" and the bottom with ⅝" iron rivets of double best quality pitched 2" throughout. Each pan to have 3 strong lifting straps on each side and the usual arrangement for washing out. Each pan to be supplied with dodging plank and hangers. [431]

8.5: Pan 5 from the Lion Salt Works, shows how the pans were built of several plates of metal riveted together.

Combined with the memoirs of Tom Lightfoot, these specifications allow a broad understanding of the construction of the pans to be obtained.

The base of the pan was of Siemens Martin Steel, the angles of the pan (i.e. 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 riveted together. The specification and an associated plan show the alignment of the plates as much thicker towards the front where the fires were placed and thinner to the rear. This meant that the size of the plates reduced but the quantity increased. The thickness of the plates was variable between ⅜" at the front to 5/16" in the middle to ¼" 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. The plates were riveted together using ¾" diameter rivets in the side of the pan and ⅝" diameter rivets in the base of the pan. The pan saw 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'. [432] The later examples were welded as opposed to riveted.

Three hoops for lifting the pan in order to clean and repair it were positioned at either side. The pan was drained via the 'coffer hatch hole' that was 4 ½" square. The dodging planks were located at the front of the pan and allowed cleaning of the scale that formed on the pan during work. 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 (see below).

Brine was fed into the pans via a series of ferrous metal pipes, which ran from the brine tank underground and emerged in the pan houses, before turning and passing into the top of the pan. A series of taps allowed the control of the brine to different areas of the site. Henry Ingram Thompson describes the pipes at the Sunbeam Works:

3" brine pipes to be fixed along front barricading to have 3" T's and wheel valves, pipes to be carried through barricading ready for coupling to brine main. Valves to have gunmetal spindles and seatings. Each pan to be provided with wood spout for conveying brine from valve to pan also with iron spouts and mouth pieces for conveying brine from hurdles back into the pan. [433]

The Kilns and Furnace

The pans were built over large brick structures – the kilns. Henry Ingram Thompson's specifications in 1895 suggest how the common stoves were built:

Pans to be set up on 9" brickwork throughout with usual solids between ash holes and 40 fire blocks between furnaces of each pan. Three jigger pillars 18" square to be built on each side of pans and tied in with pan walls. Flues to be formed to your instructions. Flues leading from pans to chimney to be of brickwork, outside walls 9", inside 4 ½", covered with cast iron flue covering ½" thick. One

431 LSW NOCMS: 1986.3783.8.7

432 Fielding 2000, 61–64.

433 LSW NOCMS: 1986.3783.8.7

damper plate to be fitted at the back end of each pan. [434]

The kilns consisted of a rectangular, outer wall of bricks, proportional to the dimensions of the pan it supported. The sides of the kiln were *c.* 2–2.5m high. The interior of the kilns were filled to *c.* 1m with waste ash and clinker. Running up and down the kiln were a series of flues that carried away hot air from the fires via an updraft to the chimneys.

The jigger pillars were set externally at the sides of the kiln. They were designed to carry the 'jigger tool'. Specific to the salt industry, this tool enabled the pan to be lifted for cleaning and repair. The 'jigger pillars' also kept the walls from bulging and breaking with the build-up of ash and waste material inside the kilns. These were supplemented by brick piers that supported the kiln's sides.

The entire pan was not heated. Instead fires were set at the very front of the kiln in the area known as the furnace. Originally the kiln would have been coal fed via the ferrous metal fire doors on the front end of the stove. Henry Ingram Thompson specification of 1895 gives some details of the construction of these furnaces:

Each pan to have four furnaces and two flat bottomed railway metals for carrying dead-plates. Bottom dead-plates to be 6'0" long x 20" wide x ½" thick of brown iron. Top dead plates to be 5'0" long x 9" wide x ½" thick of brown iron. Fire doors frames to be of 2" square wrought iron, fire doors to be steel 5/16" thick. The openings in fire door frames to be 20" x 20". Each furnace to have 2 grate bar bearers to be of wrought iron (railway metals). Grate irons to be of wrought iron 4'6" long x 1 ¼" square. 30 grate bars to be supplied to each furnace. [435]

The specification details the furnace, which was essentially a grate made up of a series of 30 cast-iron bars on which the fires were set. These were set on a series of bearers [reused rail tracks], supported by intermediate brick pillars known as 'solids' between each furnace. The dead-plates were set above and below the grates to retain the heat of the fires. Coal was shovelled into the furnaces via a series of fire-holes. These were set within the brickwork at the front-end of the pan. This was known as the 'forby'.

The front of the pan was directly heated by the fires but the remainder of the pan was indirectly heated from the hot air passing along the flues as it was exhausted through the chimney. [436] A series of flues (six for the fine pans at the Lion Salt Works) were aligned along the kiln, with an area at either side known as the dead draft adjacent to the edge of the kiln. In fine pans the flues would continue north into the stove house beneath the intermediate wall and eventually exhaust through the chimney. In butter, common or fishery pans the flues would exhaust directly through the chimney. Each pan or series of up to five or six pans would be served by a chimney.

The Hurdles, Ditches, Dodging Planks

Along either side of the pan was a wooden walkway known as the hurdles (8.6). The design of the hurdles was unique to each pan but was generally of thick timber floorboards supported on joists and post supports. It was from here that the lumpmen drew the salt from the boiling pan (see process below).

In the common pans the hurdles were open to the elements and would be wider, and often connected to the adjacent pan. They would be used to store salt on as it drained and dried prior to removal to the warehouse. Henry Ingram Thompson's specification of 1895 describes the common pans at the Sunbeam Works:

Middle hurdles to be 12'0" wide carried on bearers 9" x 4" spaced 3'6" apart. A row of posts to be placed under each side of hurdles to carry hurdle bearers, posts to be 7'3" with 4 ½" x 3" batten along the top under ends of hurdle bearers, the bottoms of posts to rest on sill 9" x 3" carried on 9" brick pillars on each side, tied into and projecting from the pan walls. Sill to be strengthened by two rows of scantling 3 x 2 ½" posts to be tenoned in between them.

434 LSW NOCMS: 1986.3783.8.7
435 LSW NOCMS: 1986.3783.8.7

436 Fielding 2000, 12, fig. 15.

Side hurdles to be 7'6" wide carried on bearers 9" x 4" spaced 4'0" apart outside ends of side hurdles to be secured with plate and screw bolts to posts of barricading, inside ends to be carried same as middle hurdles on 8 pillars capped with timber.

Hurdles to be covered with 3" planks caulked and made brine tight also to have the usual elevation above pan rims inclines and other arrangements to convey brine back into the pan [in pencil], same as those now fixed at the Lion Works. The hurdle planks to be nailed down with 6" steel clasp nails.

Standing sides to be formed between pans and hurdles and between pans and back gangways to be 20" wide covered with 2 rows of 9" x 3" planks. Gangway to run the whole length of back end of pans level with and connected to each hurdle to be 9'0" wide covered with 3" planks to be carried on outside wall of flues and 2 longitudinal bearers supported on 4 brick pillars (behind each pan) capped with timber middle bearers to be 4 ½" x 3" side bearers 9" x 4". Each pan to have two sets of brick steps capped with timber from coal hole to standing side. [437]

Unlike those of the fine or lump pans (see below) the hurdles at the Sunbeam Works had an area for standing on one side and a higher 'hurdle' on which the salt would be placed to dry, and excess brine could drain back into the pan (Tom Lightfoot describes a similar arrangement). They also had a gangway around the back of the pan. The pencil notes accompanying the specification suggest that the pans at the Sunbeam Works were based on those at the Lion Salt Works, and it is tempting to see the description above as an accurate representation of the four/ five buttery and fishery pans put up in the 1890s.

8.6: Jonathon Thompson stands on the hurdles and draws the salt at the Sunbeam Works, Wincham.

Below the hurdle and running alongside the stove would be a brick ditch designed to collect and drain away waste brine during the process of skimming (see below). Henry Ingram Thompson's again describes these hurdles:

Sewer, the pans to let out at back end, channels of puddled clay to be formed under hurdles to convey brine to sewer along coal-holes. Sewer to be laid with 6" socketed earthenware pipes to have cesspool opposite each letting out channel formed with brickwork and covered with frame and lid 3" thick. Channel immediately under letting out holes to be paved with bricks.

In the fine pans the hurdles were narrower as they were only used to store blocks of salt temporarily (see below). They led directly into the stove houses via two doorways. When blocks of salt were formed they would be wheeled into the stove houses on salt barrows.

The Pan House – Fine Salt

Fine salt was produced in enclosed buildings known as pan houses (8.7). The pan houses were predominantly made of timber, which did not react to the salt steam and would not decompose. The timbers become impregnated with salt over time. The side walls of the pan houses consisted of a low brick 'sill' wall with a wooden wall above of long vertical timbers clad in horizontal planks (8.8).

437 LSW NOCMS: 1986.3783.8.7

8.7: The fine pan consisted of a pan house with an attached stove house. Pan and Stove House 3 can be seen in this image from the 1960s. The distinctive wood-built, hipped roof pan is located in the foreground with an attached brick-built stove house behind. The chimney vented hot flue gases from both structures. A gap in the roof of the pan house allowed steam to escape. Pan Houses 3 and 4 were altered in the 1970s and are now closed in.

The fronts of the pans were originally open with a wooden cover over the stoves known as a 'caboose'. This allowed an open-air area for the men to feed the stoves with coal. The pans were altered in the 1970s and are now closed in.

The roofs are now plain pitched roofs but originally had hipped roofs. Latterly, they were covered with corrugated asbestos, but originally they would have been felted. They were supported by wooden trusses, and were open at the apex to allow steam to escape from the pans below. The sides were covered to allow the workers some protection from the weather.

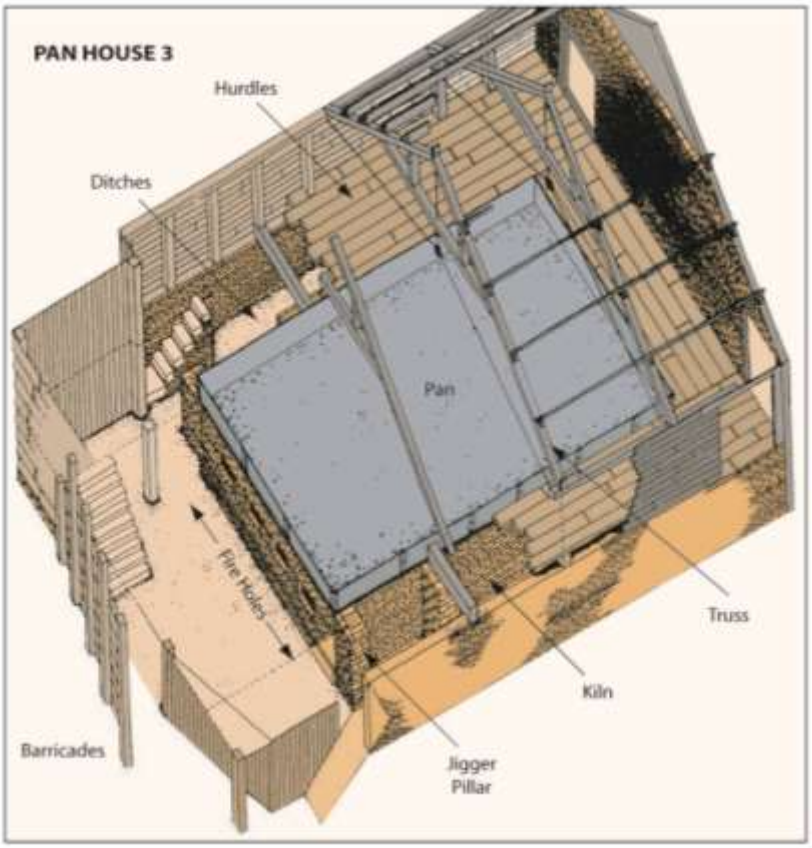
Henry Thompson described the approach they had to building the pan houses:

It [approach towards materials of construction] *was principally timber and bricks and as little steel as possible. The salt pans themselves of course, were built of mild steel. But we didn't construct any of the roofs of steel because of a corrosion problem that was very acute. All of the roofs were timber built and in the early years they were elm, they were not covered in sheeting of any kind. I can remember my father telling me that grandfather used to buy from the grain ships the corn boards, as they were called. These were the boards that divided the cargo of grain, wheat from Canada to the United Kingdom and the hold of the ships were divided off so that the cargo wouldn't shift, shift in rough weather, and when they got to Liverpool these boards were removed and they were perfectly good timber and grandfather used to buy these boards and they were used for pan house roofing and they were still on some of the roofs when I went to work there. But, subsequently, we used asbestos, sheets, actually.* As *far as the corn boards we were not concerned they were not tongue and groove. They were placed butt up to one another but at the peak of the roof there was a gap of about three feet wide was left the length of the building so that this allowed steam to escape.* [438]

The combination of escaping hot gases mixed with the salt steam in the air (8.9). This made the gases hot and the salt made them corrosive. The salt would 'eat away' at the iron and steel fittings and cause them to decay. Salt does not cause corrosion of metal directly. Salt is hydroscopic. This means that salt attracts water. Since water is needed for corrosion (along with oxygen), salt helps gather that water. A salt works created the ideal atmosphere for corrosion. Metal was therefore, generally avoided as a building product.

8.8: The environment within the pan house was extremely humid, despite ventilation. The vapour rising from the boiling pan would cloud the entire room forcing the men to work bare chested in simple shorts and clogs.

438 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.



8.9: Pan House 3 had a typical layout of a fine pan with pan, kiln, fire holes, furnace and ditches. The caboose had been removed in the 1970s, and replaced with a covered pitched roof. Picture courtesy of Donald Insall Associates.

The Automated Pan

In the 1970s, the economic conditions led to a drive for automation of as much of the process as possible. This led to the construction of an automated pan:

I made a salt producing plant which didn't require lumpmen to operate. I visited Germany and also the United States in order to get ideas to produce salt by mechanical means and I did, eventually, build a salt pan which didn't require lumpmen or lofters and the method, briefly was that we altered one of the existing salt pans so that we could use a beam, to which we attached rakes and the beam reciprocated back and to up and down the length of the pan and we had a ramp at one and the cycle took about quarter of an hour and the salt was raked off the bottom of the pan, off the ramp, by each succeeding load and that fell on to a belt and it went through a series of driers and it produced round about the same as we got with the manual method. But there were problems with drying it. The biggest problems were, in fact in drying of the salt, rather than in extracting it from the pans. But labour was always a problem for us and it was, as far as I was concerned, certainly a step in the right direction, having put ourselves in a position where we could dispense with lumpers, but in the end, although we ran it for about seven years, we did finally give it up because the West African market was starting to deteriorate quite seriously and the plant went into disuse and although bits and pieces of it are still at the works now, they will certainly never work again. But it was a very interesting exercise for me. …I had high hopes of building a second one which I think would have been better than the first one. [439]

These developments were the final technological stage of open pan salt production.

439 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

Salt-making: The Stove House

The biggest variation between the fine pans and common pans was the addition of the Stove House. Once the salt had been formed into blocks it was passed from the Pan House to the Stove House for drying. This was a large brick building that used the heat from the furnace to dry the salt in blocks. The upper part was a warehouse for storage and processing. The Lion Salt Works had a stove connected to all the pan houses that survived into the 1980s (again numbered 1–5). Four of these survive whilst the fifth has been dismantled and rebuilt as the visitor's centre.

- Stove House 1 (AKA The Link Block) – this originally connected to Pan House 1 and was one of the first built on site in the 1890s. It has almost entirely collapsed.
- Stove House 2 survives on site next to the canal. It again dates to the 1890s. It has a timber first floor unlike all the other stove houses.
- Stove House 3 runs next to Ollershaw Lane and dates to 1900. It is made of brick with distinctive rail tracks used to support the warehouse floor.
- Stove House 4 was built in 1956 to replace a series of four common pans.
- Stove House 5 was built in 1965. It has been dismantled but will be rebuilt as a purpose built area of the new museum.

The Stove House was built directly behind the Pan House. It had brick-built walls, two-and-a-half stories high with a pitched roof on top. The entire ground floor inside was filled with hard concrete material to the same height as the level of the pan in the adjacent pan house.

The Hothouse

On top of this material, the stove house contained a series of low flues in the form of two-foot (60cm wide) tunnels that allow hot air and gases to escape from the stove. The room was known colloquially as the 'hothouse' or 'hotties'. The heat from the hot air was then recycled to dry the blocks of salt. The hot air from the furnace in the adjacent pan house would pass along the pan and under the wall between the pan and stove house. From here it entered flues that ran up and down the stove houses, with a cross-flue at either end. The hot air then passed through a single opening at the end of the stove house to the chimney. The chimneys provide ventilation for hot flue gases from the stove.

All chimneys work on the draught principle in which the combustion flue gases inside the chimneys or stacks are much hotter, and therefore less dense, than the ambient outside air. This causes the bottom of the vertical column of hot flue gas to have a lower pressure than the pressure at the bottom of a corresponding column of outside air. That higher pressure outside the chimney is the driving force that moves the required combustion air into the combustion zone and also moves the flue gas up and out of the chimney. That movement or flow of combustion air and flue gas is called the draught. The taller the chimney, the more draught is created.

The draught was controlled by 'damper plates'. These were metal plates that acted as gates stopping or allowing air to pass through the flues to the chimney. The damper plates were controlled by wires, pulleys and weights. By controlling the draught more air could be brought into the fire, bringing more oxygen and making the coal burn rapidly and hotter. Alternatively the fires could be 'shut down' to burn with a slow ambient heat perfect for making salt.

8.10: On the ground floor of the stove house, the heat from the furnace was used to dry the salt in lumps. The hothouse of Stove House 3 is shown here.

The hothouse was where the blocks of salt were baked dry (8.10). The blocks of salt would be turned out into the flue level of the stove house and stacked by the lofter. The flues were built of

thin brick walls covered in iron plates. Hot air would heat the iron plates on top of the flue. Between the flues were a series of lower 'ditches' that became filled with loose salt from the blocks.

The Warehouse

Above the hothouse was a warehouse level (8.11). This was built of either wood or steel and was open to the roof trusses. The warehouses were purpose built into the stove houses. These were used to process and pack the salt and were known colloquially as the 'lump room' or 'mill room'

The warehouse was where the salt was finally dried and packed. Traditionally, these structures were built entirely of wood, with wooden columns supporting the floor beams and roof structure above.

8.11: The upper part of the stove house was a warehouse for storage and processing. This example is the original lump room from Stove House 5.

Within the Lion Salt Works a combination of material has been adopted. The warehouse roof was supported by a series of wooden trusses on top of wooden posts that form an aisle. The floor of the warehouse was held up by a series of reused railway tracks held up by cast-iron columns. The roof of Stove House 4, in comparison, was built entirely of a steel frame constructed in 1956 and had been corroded by salt in places.

The warehouse was traditionally where the women worked. They operated the crushing machines. They also packed the salt in sacks and packages.

Salt Making: The Salt Store

The lower grade common or fishery salt, unless bagged immediately for market, was stored in a large store house. Store houses were simple buildings, built all of timber or with brick footings only. The interior was a large open space with roof trusses supported on timber columns. The floor was either of brick, timber, or a combination of the two. A thick layer of salt would be laid down over these timbers and then Common or Fishery salt was stored in bulk form.

Tom Lightfoot describes a design in which the salt store was connected directly to the common pan. The store was built at a level below the common pan, with staging running from the hurdles out over the store. The 'wallers' would simply load salt into barrows and pour it directly into the warehouse. The size or depth of warehouses varied according to where they were built. Some would be 7 or 8 feet (2.5m) deep, others were 20 feet (6m) deep. [440] The description of these works suggests that they were located on the river banks of the Weaver, where the natural slope could be used to construct these structures. Examples of these salt stores survived along the River Weaver until the 1970s, the last ones being demolished due to their unsafe condition.

8.12: The Coronation Salt Store, Marston, formed part of the Lion salt Works but was located opposite the site on the other side of Ollershaw Lane.

The common pans visible on plan along the Trent and Mersey in the late-19th century tend to be in

440 Fielding 2000, 17.

banks of four, five or six with salt warehouses located separately. This suggests that a simple design proliferated in Marston and Wincham, due to the presence of a relatively flat topography on the sites. These are visible on the 1st, 2nd and 3rd edition Ordnance Survey maps as medium-sized buildings independent of the banks of four or five common pans. Two can be seen to exist on the Sunbeam Works site for example. The Coronation Salt Store located on the western side of Ollershaw Lane, represents the only surviving example in the whole Cheshire salt district.

The example of the Coronation Salt Store suggests that they are generally constructed in wood in a similar manner to the pan houses. A low sill wall of brick supports a stud wall, with horizontal planks on the exterior. The roof was pitched, or in the case of the Coronation Salt Store, barrel vaulted. The interior would be open, with a brick floor. The bricks were laid on cinders with no mortar between. Timbers would be laid on top of this. The whole floor, therefore, acted as a drain and allowed the salt to dry. [441] Salt would be stored to several metres in height within the salt stores.

Salt Making: The Ancillary Buildings

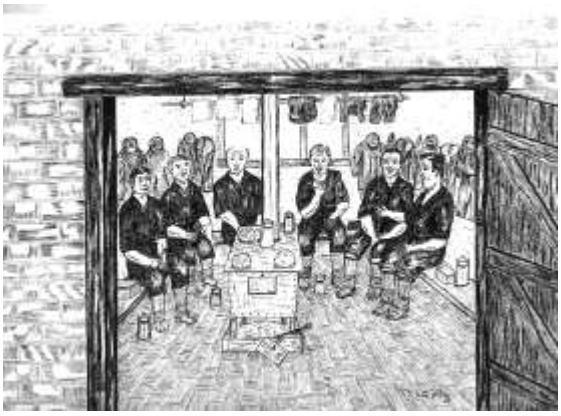
There were a number of ancillary buildings around the industrial buildings of the open-pan salt works. They were designed to support the day-to-day running of the salt works. These appeared on many, but not all of the works.

Offices

The administration of the salt works was sometimes but not always provided by a site manager. Offices would have been housed in buildings on the site, or cottages located on the site. No site office appears to have existed at the Sunbeam Works. Instead the Manager's House at the Lion Salt Works acted as an administration hub for both works. The Manager's House appears to be an unusual building but probably not unique.

The Waller's Hut

The salt workers generally worked in covered conditions, inside the pan and stove houses, or packing in the warehouses. This was not the case for one group of workers the 'wallers' who made common and fishery salt on the sides of the open pans. For this reason they had their own personal facilities, a small hut. It was heated by a coal stove, day and night, and this not only provided warmth for the wallers to dry out, but also heat so they could dry their clothes on washing lines. [442]



8.13: This image by Tom Lightfoot shows the Wallers on their morning tea break.

Smithies

The sheer quantity of metalwork on a salt works: the brine pipes, the pans, the machinery, etc…, and the corrosive effect of salt on this metalwork meant that repairs were continuous. Each salt works generally contained a purpose built smithy, staffed by specialist salt works smiths, known as pansmiths (see below for a discussion of pansmiths). Riveting pan plates together was a skilled job involving a variety of skills and tools. Later pans would be welded not riveted. Metal workers were also required to make rakes and skimmers and to make repairs to the salt pans. The smithy was one building that existed on most sites. The smithy at the Lion Salt Works, was a single-storey building with a central forge and a variety of associated benches and tools (see Volume VI for a detailed description).

Picking and dodging the pan

One of the problems of producing the salt was the formation of 'panscale' at the bottom and sides of the pan.

441 Fielding 2000, 18.

442 Fielding 2000, 42–43.

'Panscale' was similar to scale in a kettle, it formed where deposits of sulphate were laid down around the pan, and salt particles adhered to them. This impeded the pan's efficiency and so it had to be cleaned every week. The scale was removed by a process called 'picking'. A large hammer was used to break away the scale from the base of the pan. This involved striking the side or base of the pan in order to dislodge panscale into small bits known as 'seggurs'. This was usually done in the fine pans first thing on a Monday morning prior to setting the fires (8.14).

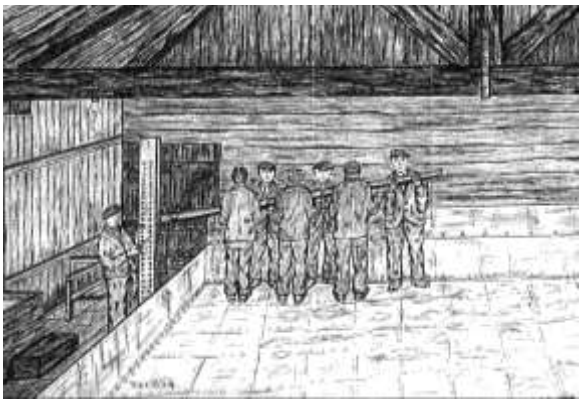
Dodging the pan was a similar but more hazardous process. The hardest scale formed at the front end of the pan, where the heat from the fire was most intense. This formed a glow beneath the surface of the brine known as 'seeing the moon', as the bottom of the pan overheated with potentially disastrous effects.

If this was left unchecked it would cause the pan to leak directly into the fires. A pick-like implement known as a 'dodging hammer' was used to remove this scale while the pan was still boiling. The 'dodging' boards along the front of the pan allowed safe access.

8.14: On a Monday morning before the pans were lit the Pan 3 would be 'picked'. Miles Hughes, lived in the pub opposite Pan House 3, and recalled how the village of Marston would resound with the sound of the pans being struck at 6.00am.

Repairs to the pan

When the pan did leak it would require repair. The pan was built of a series of plates riveted together. This meant a single panel could be removed and replaced easily. A jigger tool would be used to lift the pan on each corner to allow access underneath (8.15).



8.15: In order to remove the metal plates from the pan it had to be lifted. The workers used a 'jigger tool' set at each corner of the pan on a brick 'jigger pillar'. The pan was then lifted by levering it up on hooks placed on each corner. Six or eight men stood in the pan lifting the lever. A pin would be put in place. This image by Tom Lightfoot illustrates the practice.

Riveting pan plates together was a skilled job involving undertaken by the pansmith. The rivets would then be removed and a new plate cut to size and riveted back into place. Later pans would be welded not riveted.

8.16: Each salt works generally contained a purpose built smithy, staffed by specialists known as pansmiths. Metal workers were also required to make rakes and skimmers and to make repairs to the salt pans.

The sheer quantity of metalwork on a salt works: the brine pipes, the pans, the machinery, etc, and the corrosive effect of salt on this metalwork meant that repairs were continuous (8.16).

By the 1960s these jobs had been replaced by specialist contractors catering to the salt industry. The pans were repaired by John B Fletcher of Rudheath and James Littler of Northwich made salt tubs on demand.

Carpentry Workshops

As with the metalwork, continual repair of the wooden elements of the buildings meant that a joinery workshop was likewise a necessity. At the Lion Salt Works this adjoined the smithy at the southern end (see Volume VI for a detailed description). Carpenters made the wooden salt moulds and repaired the salt buildings. A circular saw was powered by a line shaft from the Smithy building.

Running the Salt Works: Making Salt

Making Salt using the Open Pan Method

The production of salt by the open pan method is essentially simple and unchanged since the Roman period when the first lead salt pans were used. Brine is evaporated in a metal vessel by the application of heat. By the 19th century, the process had become an art, using larger iron and steel pans (see above). Tom Lightfoot's memoirs provide a detailed description of the individual trades in the salt works, [443] all of which were operating at the Alliance, Lion and Sunbeam Salt works in the 19th and 20th centuries.

The basic process for making fine or stoved salt and coarse, fishery or unstoved salt was identical. Brine was boiled in a pan until salt crystals formed. The variation came later in the process. Unstoved salt was dried on the hurdles in walls and sent straight to the salt store. Stoved salt went through a more complex process of turning it into lumps, which were dried and processed in the stove house. The process is described below in 8.17.

443 Fielding 2000

Boiling the Pan

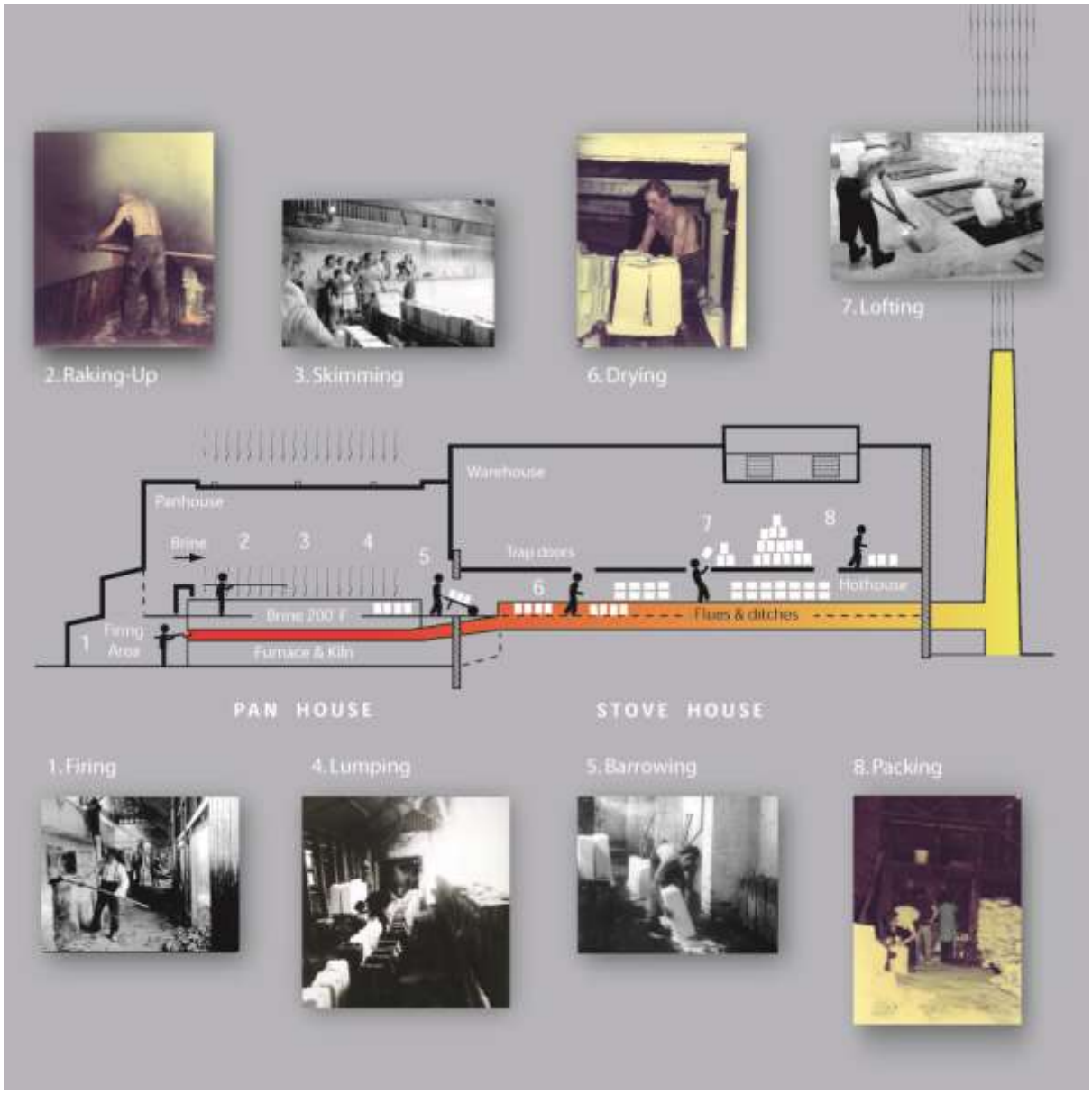
The process started every Monday, when brine was pumped into each pan from the storage tank and the fires below each were lit. Each pan contained 6,000–7,000 gallons of brine a quantity known as a 'draught'. The brine was brought to the pan by a series of pipes connected to the brine tank. As the brine evaporated it would be topped up with more brine. [444]

The basic process was described by Henry Thompson:

…the process is that at the start of the week the pan is filled up and the fires are lit whether they be coal or oil or gas and it takes about eight hours to heat up to its working temperature which is round about 200 degrees Fahrenheit and the salt crystals start to form on the surface and as they get heavier they fall to the bottom and the water vapour comes off and goes out through the roof to atmosphere and this process continues on a 24 hour basis five or maybe six days a week and a salt pan on average, weekly production is round about 35 to 40 tons per pan. [445]

As the pan came to the boil, it was said to 'chuckle' (8.18). Sometimes, the pan did not 'chuckle' at all until the second day. The temperature of the pan was critical to the production of the salt. Variation in the density of the salt was controlled by temperature. For example Butter or Dairy Salt was very fine and dense. Therefore, it required a very high temperature of near 100°C (200°F). Common or fishery salt would form at much lower temperatures of 38°C (100°F). The type of salt produced in each pan would change from one week to the next. The process was set up to boil 'heavy shoots', fine dense salt, one week and 'light shoots', light flaky salt, another. [446]

444 Thompson, n. d. (*c.* 1985), 11.
445 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
446 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.



8.17: The salt process – Stoved or lump salt involved several process from the initial firing of the pans, drawing the pans (raking-up, skimming), producing lumps, barrowing the lumps to the hothouse, drying the lumps for up to two weeks, lofting and then packing the salt. The whole process could take two to three weeks.

In the fine pans, the salt was controlled by the 'Lumpers'. Lumpers were salt workers who made the blocks of salt. It was a skilled job requiring experience to heat the brine to the correct temperatures to produce the different grades of salt. Up until the very end of the Lion Salt Works, they were paid on a 'piece' basis. That is to say they agreed to a list of prices which varied, depending on the type of salt they were making.

The quality of the crystal was part of the salt-maker's art. It would be the job of the 'lumpers' to judge the quality of the salt crystals. Often it was a battle between Henry Thompson and the lumpers to produce the correct density of salt:

… [We had] not very much [flexibility in terms of finished product], but one had to be careful that you struck a happy medium as regards density. On the one hand you could have the salt too light, in other words less than 35 lbs per cubic foot and if that happened you couldn't physically get the finished product into the bag. It was not possible to get 40 lbs into a bag, because it was too light.

But on the other hand if you erred on the other side and the salt was denser or heavier than it should have been the 40 lbs bag would not be filled to the top. It would be three quarters full and that wouldn't be any good either so from that point of view we had to be as observant as possible. There were all sorts of other factors that used to come into this. There was usually a struggle to stop the lumpers from making it too light because it suited them because they were paid on piece work basis and they were paid so much for so many lumps and it was in their interests, if they could get away with it, to make the salt as light as possible, so that they would get more lumps out of it. So it was a continuous battle between myself and the lumpers that they played the game. That was always a thorn in my side, most of my working life, that was the sharpest and biggest thorn, I would say. [447]

While the salt was being produced, the pan had to be attended 24 hours a day. In the 19th century, this often meant that the pan was a focal point for a whole family. At the Lion Salt Works, several of the pans were given nicknames by the lumpers who operated them. Pan Number 1 was known as 'Little Dolly', while Pan Number 3 was called 'Bluebell'.

The salt within the fine pans was subject to variable temperatures. This was due to the variable heating conducted under the pan. The fires were set at one end of the pan and would produce intense direct heat that caused the brine to be heated to temperatures approaching boiling point (100°C, 212°F). The salt from these areas would produce the finest salt.

Further down the pan indirect heat was used from the hot air escaping down the system of flues beneath the pan into the stove house. This created slightly lower temperatures that varied from 200°F to as low as 100°F at the far end of the pan. The variable temperature produced different grades of salt. Although the primary purpose of the fine pan was to produce high grade salt, the lower grades of salt were also collected and set aside for alternative uses. These were referred to as back-ends.

447 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

8.18: As the pan came to the boil, it was said to 'chuckle'. As salt crystals formed a layer known as the set appeared across the top of the salt. The salt crystals dropped to the bottom of the pan.

Dear Sirs, My boats 'Willie' and 'Abel' will be with you on Saturday morning to load one boat 80, other with clean common salt. Kindly leave back-ends on hurdles for me. Thomas Hassall, Ducie Street, Piccadilly, Manchester. [448]

Doping the Pan

The difficulty of making the pan 'chuckle' was solved by a process referred to as 'doping'. Doping involved the addition of a crystal modifying agent designed to start the process of salt crystallisation and control the type and size of salt crystals formed.

It had been undertaken throughout the history of open pan salt-making. In the 18th century John Ray noted:

When the liquor is more than lukewarm, they take strong ale, bullock's blood and whites of egg mixed together with brine in this proportion: of blood one egg-shell full, the white of one egg and a pint of

448 CRO D8645 LSW 90/229/62, Delivery Note 29 August 1907.

ale, and put into a pan of 24 gallons (of brine) or thereabouts.[449]

In 1808 Henry Holland suggests a different mix including acids, animal jelly and gluten, vegetable mucilage, new or stale ale, resin, butter and alum. He comments;

These additions vary in different works, and many of them seem to be made from particular, and often ill-founded prejudices; and without any exact idea as to their probable effects.[450]

These concoctions had been replaced by the 19th and 20th century. Tom Lightfoot describes the use of glue and soft soap:

If the pan was making soft shoots [light lumps of salt] *called Lagos* [e.g. Lagos Salt]*, sometimes during his shift when he thought it necessary the lumpman would take a piece of glue about three inches long by half inch wide (76mm x 12mm) and the thickness of the glue which was quite thin. He would throw this into the pan at the back of the part where it was boiling.* [451]

Glue addition produced coarse crystals which gave light lumps and a low bulk density salt after crushing such as Lagos Salt or Factory Filled Salt (see section 7.3). [452] The use of glue appears to have been, a workman's or foreman's trick as opposed to a commonly prescribed practice, according to Norman Eaton, speaking in 1989:

I have been told about the tricks to make the salt coagulate quicker (perhaps saving an hour of time) but you didn't have to let the boss know of course. One was to throw in a small square of a cake of Scotch Glue (about an inch square) into the boiling pan. It was said you could see the salt clinging to the melting glue as it was slowly going down and 'once it started it was away'. Getting it to 'start' was the secret. One man told me if you ran out of glue (the foreman kept a small square in his pocket apparently) a piece of chewed chewing-tobacco would do the same, if more unhygienic, job, but Heaven help you if the boss caught you as the product was sold as 'pure'.[453]

Soft soap specifically produced fine salt crystals which formed heavy lumps that gave crushed salt with a high bulk density, such as dairy salt (see section 7.3). [454]

If the pan was making heavy shoots [heavy lumps of salt]*, called hand-its, he would take a handful of salt from the top of a tub, dip his fingers into the soft soap box, and then mix the soft soap and salt together until it was crumbly then throw this across the back of the boil.* [455]

The practices clearly occurred at the Lion Salt Works as Henry Lloyd described it in 1988:

…vegetable soft soap, was widely used in the trade. What it actually did was it produced a curd or scum the same as one gets if you wash your hands with soap in hard water. Well exactly the same thing happens if you throw a little piece of vegetable soft soap into a hot salt pan. It melts and produces very, very, fine particles of curd. The chemical reaction of which I forget right now but curd is produced and this curd is the starting point for a crystal of salt to form and, depending on how much soap is put into the saltpan controls the degree of set as it was called, which is a skin on the surface of the brine. Also another agent was resin which had a very drastic effect in terms of set. It put a skin on it so tight that it would virtually stop the pan from evaporating and from working. But vegetable soft soap was the chief agent for controlling rate of evaporation and temperature. [456]

The science appears to be poorly investigated and understood but the pattern of mixtures appears to be common. Animal protein in the form of eggs, animal jelly, glue or soap is added to the mixture and creates, 'the curd' as Henry Thompson refers to it, on which the salt crystals can form, like snow or ice particles form in the atmosphere. In addition an acid or alkali mixture is added to the brine –

449 Chaloner 1961, 63.
450 Manley 1884, 43–44.
451 Fielding, 2000, 26.
452 Twigg 1993, 9.
453 CRO D8645 LSW Norman Eaton, oral history transcript, 1989.
454 Twigg 1993, 9.
455 Fielding 2000, 26.
456 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

acid in the form of stale beer or alkali in the form of soap. This is likely to affect the pH balance of the brine encouraging different sizes of crystal to form.

Firing the Pan

Firemen were responsible for setting and stoking the fires beneath the salt pans (8.19). The fireman may also have been the senior lump man. This was a skilled job as the heat from the fire was required to be set accurately in order to make the correct grade of salt crystals. The Daily Graphic described the process in 1881:

It takes about 10 cwts of fuel to make a ton of salt; the finer, or boiled salts, take more than 10 cwts. The quantity of fuel used is enormous. In a good year, as much as 750,000 tons of fuel are used in Cheshire alone, in salt making and its attendant businesses. [457]

Coal was originally used to heat the pans. Up until 1942 the Lion Salt Works used the lowest grade of coal in the stoves. This was known as 'slack', the lowest finest grade, or 'burgy' a slightly superior grade. It was brought predominantly from the Staffordshire Collieries, but some may have come from St Helen's.

A single 1910 receipt shows that coal was being shipped on board Robert Heath and Sons boats from the Biddulph Valley, Norton Colliery. [458] At the beginning of the First World War, coal was still brought by narrow boat, but by the end of the war it was being brought by rail. The main source was known as Sneyd Burslem Slack, from the Sneyd Green Collieries or B M Burgy, also from the Staffordshire Collieries. By the end of the war there is some indication of more diverse sources including slack from Worsley in South Lancashire. [459]

Coal was brought to the site by small wagons on an individual train track. These tracks ran along the front of the pans and allowed coal to be stored adjacent to the stoves (see Transport below). Coal was stored behind the wooden barricades, a series of horizontal planks set on side, along the front of Pan 3 and 4.

8.19: Firing the pan at the Sunbeam Works, Wincham. Firing the pan was a skilled job as the heat from the fire was required to be set accurately in order to make the correct grade of salt crystals.

In 1942 mechanical underfeed stokers were installed to comply with the Clean Air Act. There is no evidence of the underfeed stokers on site now. Jonathan Thompson recalled that hard fired coal, from Joshua Bigwood of Wolverhampton was used. [460] This is one of the first instances where the work force was beginning to be replaced by machinery. Henry Thompson recalled his earliest memories of working the pans in the 1940s:

Fuel and wages: those were the two major [cost] factors. When I first started work the fuel was coal and that was, without doubt, the best. We used coal, I suppose, three quarters of my working life,

457 The Daily Graphic, 1890, 4.
458 CRO D8645 LSW Collection of Receipts from 1910, 13 January.
459 LSW NOCMS 1986.3783.3.16, 1914-1918 Records of Transhipments

460 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.

either on open fires or, subsequently, with underfeed stokers to comply with the Clean Air Act. [461]

The two main coal suppliers who appear in the mid twentieth-century records are J. Handford and Son Ltd, a Stockport company originating in the late-19th century, and S. Taylor Frith and Co. Ltd, a Runcorn based business established in 1930, which continued to trade with Thompson's through to 1960.[462] In both cases the coal came from the north Staffordshire collieries and included Silverdale slack, Hay's Wood slack, Holditch slack, Apedale burgy, and New High Carr and Hareswood burgy slack. The Talke Colliery Company also seems to have been a supplier.[463]

Henry Thompson recalled the final change in fuel to retrograde (reused second-hand) oil:

And then, we were persuaded in 1971, I think it was, to change over to oil and it was nowhere near as good. We didn't get the lingering heat when the plant was shut down at the end of the week and also if my memory is right, oil prices spiralled and that I think was, certainly, a contributing factor to the final demise of open pan salt.

Oil was considerably more convenient, as it needed little human input and was about the same price. [464] Economically it was a sound principle to use oil, but the clear technical issues with the fuel type made it very unsatisfactory. The oil was stored in the large oil tank adjacent to Pan House 4, and fed into the stoves via a compressor in the lean-to structure by pipes and valves set in the front of the stoves. This was electronically lit and hot jets of burning oil fired the pans.

Jonathan Thompson suggested that it took, 1 ton of coal to make 2 tons of salt at the Lion Salt Works. [465] A good fireman would be able to make the most efficient use of the available fuel. In times when fuel was expensive this could mean the difference between profit and loss. In comparison recycled oil was able to produce 1 tonne of salt from 112 gallons (509 litres) of fuel. [466]

Drawing the Pan

As the brine began to boil the fine crystals rose to the surface of the brine, there they floated for a few seconds until they increased in density before sinking to the base of the pan. When sufficient salt had been thrown out of the solution it was drawn to the side of the pan with long-handled rakes. This process was known as '**raking-up**' (8.20).

8.20 Raking-up – When sufficient salt had been thrown out of the solution it was drawn to the side of the pan with long-handled rakes. This process was known as 'raking-up'. It would be undertaken daily, even where common draughts were done over two or three days.

It would be undertaken daily, even where common draughts were done over two or three days. The salt would be piled up along the edge of the pan. It would then be removed and placed on the hurdles in the case of common salt (see Walling Salt, below) placed in tubs in the case of fine salt (see Lumping the Salt, below). The salt was removed with a **skimmer**, a tool with a perforated metal

461 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
462 LSW NOCMS 1986/3783/1/12.
463 LSW NOCMS 1986/3783/1/14.
464 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.
465 Thompson n. d. (*c.* 1985), 11.
466 Thompson, n. d. (*c.* 1985), 13.

head like a shallow ladle and a wooden handle (8.21). [467]

8.21: Skimming the salt – The salt was removed with a skimmer, a tool with a perforated metal head like a shallow ladle and a wooden handle.

Walling Salt

In the case of Common or Fishery salt, this was skimmed onto the side of the hurdles and allowed to drain and dry. The process was undertaken by a separate group of salt workers known as '**Wallers**' so called because they produced 'walls' of salt (8.22). There work would often involve more labour than the lumpers but they were less well paid, because they had the sole responsibility of raking and barrowing the common salt. The fires in this instance were tended by firemen. When the salt was dried on the hurdles it was either bagged immediately or barrowed into the salt store for use at a later time (8.23).

Wallers were specific salt workers who produced common and fishery (see above). They generally worked in the open, as the Common and Fishery pans were not covered. For this reason they had their own hut on site. The original 'Wallers' Hut' at the Lion Salt Works appears to have been located adjacent to Stove House 3 in the early 20th century. A further hut existed just south of the Manager's House until it was demolished in the 1980s. Wallers also produced butter salt in the covered pans at the south of the site. By the later 20th century the Lion Salt Works concentrated on the production of lump salt and fewer wallers appear to have been employed at the works.

8.22: Walling Salt – common and fishery salt was not made into lumps but was instead piled on the hurdles to drain and dry.

8.23: Walling Salt – the common and fishery salt was then removed in barrows to the salt store.

Lumping the Salt

In the case of fine salt it was ladled into tubs using skimmers. In the 19th century these were woven-wicker, cone-shaped baskets called 'barrows' each of which held a 'bushel', about 56lbs (25kg). These were superseded by thin oak planks, bound with copper hoops, attached around a central peg, hence called 'peg-top tubs'. [468] These were still in use at the Lion Salt works until the 1890s. [469]

They were replaced by rectangular tubs made of elm wood. The use of glass fibre tubs replaced elm wood tubs in 1974. They were ordered from North Manchester Plastics Ltd, Heywood. They

467 Twigg 1993, 11.

468 Twigg 1993, 27.
469 Thompson, n. d. (*c.* 1985), 11.

introduced a smaller glass fibre tub size in 1979. [470]

The tubs were set on the sides of the pan on metal racks known as 'salt dogs'. The tubs would have holes in their bases and would rest on the salt dogs to allow excess brine to drain back into the pan. The tubs were then drained to leave the salt in the solid form of blocks or lumps. This was known as lumping, and was the reason why these salt workers were called 'lumpers' or lumpmen. These were the highest grade of salt workers. The Alliance and Lion Salt works in the 19th and early 20th century had a small number of fine pans to produce the higher grades of salt.

The salt in the case of West Africa [Lagos Salt, see below]*, was made into lumps or blocks, measuring 20 inches by 10 inches square on one end and 8 inches square on the other, there had to be a taper in the mould in order to slide it out and the count was about 80 lumps or blocks per ton* [471]

8.24: Turning out the lumps – The lumps would be set out on the hurdles in rows to allow further settling, before they were turned out.

The lumps would then be set out on the hurdles in rows to allow further settling, before were turned out (8.24). If the lumps were not to be sold as Lump Salt (see below, section 7.3.1) they were called 'shutes' or 'shoots'. These would be sent to the hothouse for drying and ground down in the mills, so there was no reason to finish off the blocks.

If the salt was to be sold as Lump Salt more care would be taken. The next process was known as happing or squaring off. The lumps would be shaped using a wooden pat or 'happer' not dissimilar to a table tennis bat in size (8.25). At times the salt would be beaten down inside the tub in order to make a solid lump. This was done with a cricket bat shaped tool known as a 'mundling stick'. Finally the lumps were stacked on a wooden barrow and taken into the stove house.

8.25: Happing the lumps –The next process was known as happing or squaring off. The lumps would be shaped using a wooden pat or 'happer' not dissimilar to a table tennis bat in size.

Dodging the Pan

One of the problems of producing the salt was the formation of 'panscale' at the bottom and sides of the pan. 'Panscale' was similar to scale in a kettle, it formed where deposits of sulphate were laid down around the pan, and salt particles adhered to them. This impeded the pan's efficiency and so it had to be cleaned every week. The hardest scale formed at the front end of the pan, where the heat

470 LSW NOCMS: 1986/3783/3/5.
471 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

from the fire was most intense. This formed a glow beneath the surface of the brine known as 'seeing the moon', as the bottom of the pan overheated with potentially disastrous effects. [472] The scale was removed by a process called 'dodging'. A large hammer- or pick-like implement known as a 'dodging hammer' was used to break away the scale from the base of the pan.

Lofting the salt

When the salt was made into lumps it was carried through to the flue level of the stove houses or 'hotties' on barrows. Lofters were specific labourers who moved salt blocks within the Stove House, loading dried salt blocks from the flues and ditches to the warehouse floor above.

The salt blocks would initially be dumped onto the ground in the 'ditches' between the flues. The lofter would then stack the blocks on top of the flues like bricks to bake them dry. They would remain on the flues for two weeks. Above the flues were a series of salt hatches. When the hatches were open they would allow the salt blocks to be passed up to the warehouse level. Many of the lumps were required to be sold in good condition and had to be moved by hand. Lumps that were to be crushed were moved with spikes. The lofter would stick these in the lump and throw them up through the salt hatches. He would work slowly around the blocks throwing them up to the level above. The blocks would then be processed in the warehouse above (see warehouse level above). [473]

The lumps would be counted by the lumpers themselves in order to claim their piece work. They would also be counted by the foreman. Norman Eaton suggested that: '*Some bosses had a walking stick with a spike in the end, and as they went past the salt blocks they stuck the end in to make sure the blocks didn't go through the system twice (for double money)'.* [474]

472 Didsbury 1977, 148.
473 Fielding 2000.
474 CRO D8645 LSW Norman Eaton, oral history transcript, 1989.

Packing and processing the salt

The varieties of salt were packed and processed in a number of ways. Often common salt would not be packed at all and would be put on the boats ready for export.

The Crushing Mill

The Lion Salt Works contained a crushing mill. This was originally located in the warehouse of Stove House 2 at the north of the site. It was powered by a steam engine that sat on a brick base outside the stove house. The steam engine in turn was powered by steam from the boiler in the Engine House/ Brine Tank. It probably dates to around *c.* 1900 when Stove House 2 was built. It was certainly in use in the earlier years of the 20th century as it is described in some of the delivery notes:

Have ready for [Thomas] *Hassall Monday and Tuesday about 20/ 30 tons Fine dairy and balance of his boats 'Handed Squares' 80s and 160s. After you have finished grinding the above dairy proceed immediately with the light factory filled salt.* [475]

The crushing mill was moved to Stove House 4 when it was rebuilt in 1956 (8.26). Henry Lloyd Thompson the final owner and manager of the works recalled in 2009 how he dismantled and rebuilt the crushing machine in its new location.

The finer varieties of salt were all dried in block form and then put through the crushing machine. This seems an odd process but Henry Thompson explains it like this:

I haven't mentioned the rest of the machinery that we had. Perhaps I better have a word about that. The salt, after it was made into lumps was then dried and removed to the first storey where it was put through a salt mill and ground up and put into bags. The reason that the salt was made into lumps, in the first place, was that, that was the only means of drying it. And then it was put through a mill afterwards and ground up. It may seem a little bit silly to make a commodity into a

475 CRO D8645 LSW 90/229/100: Delivery Note 3 April 1908.

block and break it down again, but it was for drying purposes. [476]

The salt that was sold to Africa known as Lagos Salt was crushed prior to sale.

8.26: Henry Lloyd Thompson loads uncrushed blocks into the crushing mill in Stove House 4 to be crushed to make the finer grades of salt.

Bagging Salt

Much of the salt was bagged at the works. The salt would go in a variety of bags, usually provided by the shipping company themselves:

Salt would often be placed in store and allowed to dry.

Referring to the enclosed order for 300 tons common you must lay the salt down in the Gowanburn and storehouse so that you can bag the oldest salt first and not put fresh salt in the sacks. [477]

It was the job of the Wallers to load salt into the bags. Salt would be put in the warehouse in a layer and allowed to dry. Subsequent layers would be put on top. By the time it was required for loading the material in the middle of the pile was very hard. The Wallers would have to pick the salt out or undermine it before filling it into bags. [478]

At other times salt was put into the sacks when it was drawn from the pans, with only a few days left on the hurdles to dry:

Put 1 or 2 pans to Common Salt at Wincham and mind it is made clean. That is to put them in as you draw them and start off No. 3 pan immediately. [479]

Short-filling of the bags was an issue caused by the men, filling the bags, but also by the nature of the salt. If the salt was too dense, particularly with Lagos Salt it would not fully fill the bags.

It appears that about 60 Bags were not filled for the Manchester order and 50 bags are missing, also about 1500 sacks with 14/15 tons shortweight in Gowanburn and Constance. As far as we can make out we have delivered at Manchester about 691 tons in sacks (by count 12 sacks to the ton and about 14/15 tons short in actual weight. We shall in all probability receive a claim for the entire shipment of bags being shortweight which will be a very serious matter. If the men who filled the sacks have not been paid you must not pay them until this affair is settled. HIT. [480]

The bags would be stitched once they had been filled.

You have at works 1200 sacks 26 x 40 sent up yesterday from Anderton. Mark them G & A, 187. Fill them with good clean and dry Common Salt, 12 sacks to the ton = 100 tons. These bags must be well filled and stitched, much better than the last 200 tons. The sacks filled at Wincham were all very badly stitched. HIT. [481]

Bag stitchers were usually ladies or in the 19th century children, who came in during the day shift

476 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
477 CRO D8645 LSW 90/229/52: Delivery Note, 3 July 1907.
478 Fielding 2000, 47–48.
479 CRO D8645 LSW 90/229/53: Delivery Note, 3 July 1907.
480 CRO D8645 LSW 90/229/110: Delivery Note, 11 August 1907.
481 CRO D8645 LSW 90/229/4: Delivery Note 16 June 1905.

to sack up the salt. By the 1950s a number of women would come in to do the work (8.27). Annie Lawton speaking in 1989 recalled there were three shifts during the day. The salt would be ground and placed into 5lb (2.25kg) bags. Annie Lawton's mum went in and worked when orders came in to stitch the bags up. [482] The work was originally done by hand. Hand stitching produced 'ears' in the top of the sack enabling manual handling of the sacks. Each sack was given a 'medal' to signify the correct weight when filled. Later it was done using portable sewing machines. [483]

Lettering and numbering systems were applied to the bags using a variety of stencils. These stencils survive for many of the West African companies including Paterson Zachonis.

8.27: Bagging salt in the 1970s at the Lion Salt Works. Here the salt is being put into small packets for domestic sale.

Mark 300 sacks, 15 x 29, and 200 sacks, 19 x 33, ED SKAM KRIBI, ART No 646, Nos 501 upwards to 1000, I cannot explain about the numbering in writing. [484]

Wooden sack machines were used to weigh the salt bags. They were designed to accommodate 1 cwt (50.8kg) sacks and made by A Hilliker and Sons, Altrincham. Each was provided with a series of weights 56lb (25.4kg), 28lb (12.7kg), 4lb (1.8kg), 2lb (0.9kg), 1lb (0.45kg) and ½lb (0.22kg) weights. [485]

The Cutting Machine

Some salt was sold in small blocks like loaves of bread and were not crushed. This type of block salt was common throughout the 19th and early 20th century. Originally these were called 'handed lumps' and sold in stores whole or on the streets. The Daily Graphic of 1881, describes their sale:

When thoroughly dry the lumps will ring when struck. They are then ready for removing and sending off to all parts of the country. These are the lumps or squares, as they are often called, which are seen in all stores in large towns, or conveyed by boys in donkey carts about the streets. [486]

They continued to be popular in the later 20th century in the domestic market where housewives continued to prefer cut lump salt. These lumps were cut up by a series of saw blades (see the cutting machines below). The lumps allowed salt to be preserved for longer in damp households. Salt hardens when it is in damp air and granular salt will usually harden into a block. If the salt was bought in lump form a small amount could be removed and used as and when needed. This was usually crushed using a rolling pin or mortar and pestle.

In the 1960s, Jonathan Thompson decided to rebrand the cut lump salt as a Thompson's own brand product. For this reason the works had a series of cutting machines installed. The cutting machines used large circular saws to cut the lump salt into smaller lumps that were sold in packets (see below, 8.28).

482 CRO D8645 LSW Mrs Annie Lawton, oral history transcript, *c.* 1989.
483 Repaired by Holgate Machine Co Ltd, Salford. LSW NOCMS: 1986/3783/3/5.
484 CRO D8645 LSW 90/229/56: Delivery Note, 18 July 1907.
485 LSW NOCMS: 1986/3783/3/5, 29.
486 *The Daily Graphic*, 6 March 1890, 4.

Loading the salt for transport

General labourers carried out the huge manual work required to move fuel and salt around the salt works. They shovelled coal, cleaned the furnaces and moved vast tonnages of salt from the warehouses to the narrow boats, railway wagons or lorries.

By the 1970s a tractor was used to move salt from pan houses to salt store. The tractor was repaired in September 1973 by Gunn JCB Ltd. [487]

Running the Salt Works: Salt Types and Its Use

Jonathan Thompson speaking in 1989 stated that the Lion Salt Works produced a series of varieties of salt that included dairy salt, light Lagos salt, common salt. Of these there were grades of common salt, which included fine, medium, coarse and very coarse (hard grained salt made in 60 foot pans outside). [488] The earlier generations of the Thompson Family produced a wider variety of salt for markets in India, USA and Canada. Salt was made in two types of pan: the fine pans, housed within the pan houses and the common pans, produced in large open-pans outside. The grain size was dependent on the temperature the brine was boiled at.

Salt made in the Fine Pans

The brine was heated to boiling point and produced dense fine crystals of salt suitable for use in the home (i.e. table salt) and in the manufacture of cheese and butter. Also included in this type of salt was the distinct variety for the West African market, Lagos Salt.

Cut Lump Salt

The highest grades of salt generally went to the local domestic market. Lump salt, also known as 'handed squares' or 'hand-it lumps' were produced in the fine pans:

Load in the Constance 25 tons 'Handed Squares' and despatch her from Anderton latest noon on Monday. There is no Common Salt for Constance at present. JIT [489]

8.28: Thompson's own brand Cut Lump Salt

Cut lumps or 'handed squares' were made with much greater care and were happed (see above) during production. They were treated with great care. In the 20th century circular saws were inserted at the works to cut the lumps produced in the pans into smaller 'loaf sized' blocks of salt for sale in the domestic market (see above, 8.28).

Butter Salt

Butter Salt was made in a fine pan and could be either loose or tubbed. If loose it was drawn from the pan in the same manner as common salt and put in the warehouse. If tubbed it was made into shoots (or shuts, salt lumps made for crushing so they were not finished), dried, crushed and screened. [490]

The local Manchester market appears to have been served through Thomas Hassall. This domestic market required handed squares, common salt and Butter Salt.

Please arrange to draw 2½ tons of fine butter salt tomorrow without hindering your making of 7.7 salt. This salt is to be bagged and loaded in the Constance. It might be drawn on Thursday if you can arrange for it – to drain thoroughly before being bagged. This will be 50 sacks 1 cwt in sack. [491]

487 LSW NOCMS 1986/3783/3/5, 82.
488 CRO D8645 LSW Jonathan Thompson, oral history transcript (3) *c.* 1989.
489 CRO D8645 LSW 90/229/35: Delivery Note, 5 January 1907.
490 Twigg 1993, 5.
491 CRO D8645 LSW 90/229/30: Delivery Note, 8 October 1906.

Dairy Salt

Dairy Salt was a high bulk density stoved salt made by crushing and screening the lumps produced in a fine pan with soft-soap additive. Lump size could be 80s, 120s or 160s, but 80s were the most popular in the industry (see 8.31 below). [492]

Calcutta Salt

Specific salt types were produced for the international markets. In the early 20th century, the Indian market was served by a type of salt referred to as Calcutta Salt. [493] The Salt Union produced a similar variety of salt known as Madras Salt. [494] This like Lagos Salt (see below) was a large flaky light salt, designed to survive desiccation in the sub-tropical climate. The Indian market was not the most significant and it is notable that by 1906 many of the delivery notes had the line *…Salt Exported to the East Indies…* deliberately crossed out. [495]

Lagos Salt

Lagos Salt was a term used for a particular variety of common salt designed for the African markets. Lagos is the principal port of Nigeria and was the main location for export to the area of West Africa. The salt would be exported via the docks at Weston Point, Runcorn and Liverpool (see transport). It was a light, flaky grained salt produced throughout the lifespan of the Lion Salt Works. It was stoved salt, i.e. it was made into lumps dried and then crushed and graded (8.29).

The flaky grains of salt were sought as the African market measured salt not by weight but by volume.

But it was a very different business from either the Canadian side of it or the Indian side of it in that the salt was sold by weight but when it got to West Africa, principally Nigeria, it was sold by measure and it had to be a certain bulk density. To give you some idea of the difference, the ordinary, free flowing table salt, that most people are familiar with, is about 70lb to the cubic foot and the West African variety is 35lb to the cubic foot so it's a very light and friable, fragile commodity. But it was sold by measure and the measure was a fifty cigarette tin and that was the way things were and still is. And if didn't fill the fifty cigarette tin well then the salt was no good. You had to be very careful that you made good, clean, white, light salt. I don't know that I can remember [the volume of the fifty cigarette tin], but the bulk of the trade was done in 40lb white cotton bags, but I'm afraid I can't remember how many measures came out of it. [496]

8.29: Lagos Salt in lump form prior to crushing. There were normally 72 lumps to the ton.

The humid temperatures found in sub-Saharan and tropical Africa (e.g. Nigeria and Lagos) meant that fine grained salt would harden easily (think about salt in a steamy kitchen at home).

…the Nigerians are very traditional and conventional. Also another factor which had a great bearing on the low density, was that it stands the high temperatures and very high humidity of Nigeria. A heavier grade of salt such as vacuum salt, the crystal of which is very small

492 Twigg 1993, 8.
493 CRO D8645 LSW 90/229/33: 'Please load the Constance immediately 80 tons clean fine Calcutta Salt dry as possible and load the factory filled in her afterwards'; CRO LSW 90/ 229/39 'Load Constance with 200 tons Calcutta Salt at once. D.G.M.'
494 A sample of this salt is stored in the Salt Store, Weaver Hall Museum and Workhouse, Northwich.
495 CRO D8645 LSW 90/229/14: Delivery Note, 5 March 1906.
496 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.

indeed compared with an open pan crystal and perhaps I should add, or say at this point that the vacuum salt crystal is a cube and the open pan crystal is an inverted pyramid. They're both totally different. But to go back to the weather aspect of Nigeria: the vacuum salt would deliquesce very readily in the high humidity, but the open pan salt did not and that was one of its biggest selling points. But about 1955, the ICI produced a West African quality vacuum salt, which they called dendritic, comes from the Greek word 'dendros' which means a branch, and they were able to treat the brine so that it incurred a different crystal growth. The dendritic salt crystal had branches on and whilst it was not very much like the open pan crystal, it did have very good bulking qualities and at that particular time I think ICI had already given up open pan production and shortly after the dendritic was introduced to the West African states, Seddon's, who were the next biggest shippers, they gave up and ICI shipped, I suppose, 95% of demand. We, who were always the babies of the trade accounted for the rest of it, but there was always enough for everybody. But even so, it was not as well liked as the open pan salt, but they took it because of the price, it was cheaper. [497]

Lagos salt appears to have been produced since the earliest days of the Lion Salt Works. Significant orders were being placed in the first decade of the 20th century:

As the bags for the Lily Brand order may be rather small for the weight …please reserve all the finest salt for this order, and grind the lightest factory filled for the African order. Do not fill any of the salt made experimentally in any of the sacks. I am of the opinion that the new stoved pan makes lighter salt than the old one but use the heavier 7.7 salt for the Lily Brand. HIT. [498]

7.7 Salt

Another variety of light salt, produced in the earlier part of the 20th century was 7.7 Salt. Like Lagos salt, it was a higher grade of salt, which was lighter than the Common salt and more difficult to produce. It appeared to have been heavier than the Lagos salt (see delivery note above). A delivery note from the first decade of the 20th century indicates it was produced at a higher temperature than the common salt:

'*…Be sure to put the grainy 80 sacks where they will dry quickly as we shall be hard pushed to find 100 ton light 7.7 next week. Keep the stoves very hot over the weekend'.* [499]

Another note indicates the grain was larger, than other salt types, giving it a light nature:

The sample you have sent of 7.7 Salt is very good colour but we think rather too fine in grain to be light enough. If it is light enough to fill the 90lb sacks it may properly do. The main point is lightness and then colour. I send you a standard sample which we have to compete against but is off colour through being long in the office. [500]

Factory Filled

8.30: Factory Filled Salt made from lump salt in a fine pan

Factory Filled (8.30) was crushed lump salt that was filled into 40 pound cloth bags supplied by the shipping merchant. Factory filled salt was '*run of*

497 CRO D8645 LSW Henry Thompson, oral history transcript 1988.
498 CRO D8645 LSW 90/229/15: Delivery Note, 28 March 1906.
499 CRO D8645 LSW 90/229/47: Delivery Note, 29 May 1907.
500 CRO D8645 LSW 90/229/43: Delivery Note, 3 May 1907.

the mill' salt and the average particle size was fixed by the bottom pair of crushing rollers. There was no attempt to screen the salt. [501] Like Lagos Salt a major market was West Africa and at the Lion Salt Works 'Factory Filled' salt was commonly produced and bagged in the shipping company's own bags:

Please mark 60 white … sacks ….FACTORY FILLED. Fill with best quality factory filled salt, 12 sacks to the ton = 5 tons [equal to, i.e. 60 x 12 sacks]. Load the Constance with about 180 tons clean Common Salt dry as possible and put the above 5 ton on top. The Constance must finish on Saturday. HIT. [502]

Common or Fishery Salt

Common salt was an industrial grade of salt made in the larger common pans. By working these pans at various temperatures and for different periods of time it was possible to make salt with a wide range of crystal sizes. Common salt that took one, two or three days to produce comprised the industrial chemical grades, or Broad Salt, which was separated into Coarse Common, Medium Common or Fine Common. The coarse-grained salts were produced at lower temperatures; the crystals were cruder and took longer to form. The coarsest grade of salt took 7 days, 14 days or longer to produce and was known as 'Fishery Salt' or 'Bay Salt' after French solar evaporated sea salt that had a similar coarseness (8.31). [503]

In the early 20th century these varieties made up much of the production at the Lion Salt Works and the Sunbeam Works. Both Common and Fishery salt were produced in larger open pans, as opposed to the fine pans:

You must make all the common salt you basically can but it must be clean and white. Get all four pans down to it at Marston and put another pan or two to Common [salt] at Wincham as you draw them. Your canal boats must be back on Monday as we shall be busy next week. We want 100 tons, light 7.7 Salt on Monday and Tuesday certain. We want 300 tons Common [salt] and 200 tons Seconds Fishery [salt] early next week and all must be of the very best quality white and clean and the fishery of good grain. These are our own special orders. HIT. [504]

8.31: Salt Types – Different types of salt were produced at different temperatures and created different grain sizes.

Common Salt could also be made in the fine pans (also known as lump pans or stoved pans), but this was generally an extreme measure when large orders had come in. It does show how important the market for common and fishery salt was in the early years of the 20th century:

The 50 tons 7.7 [salt] may not be required to load until Wednesday or Thursday so if there is any hindrance put the lump pans to common for a day or two to avoid stoppage. [505]

It was normal to produce Common Salt in the Lump Pans at the end of the week. Henry Thompson described the process in 1988:

501 Twigg 1993, 11.
502 CRO D8645 LSW 90/229/1: Delivery Note, 19 May 1905.
503 Twigg 1993, 6–7.
504 CRO D8645 LSW 90/229/48: Delivery Note, 29 May 1907.
505 CRO D8645 LSW 90/229/115: Delivery Note, 22 August 1908.

…at the end of the working week the pan was shut down the dampers were dropped and the heat remaining was trapped and over Saturday and Sunday and Monday morning the brine would cool and produce a much coarser grain of salt which was removed the following Monday morning and that was used for hide and skin curing, sometimes road salt, to the delicatessen trade etc. Having removed the salt the pan was emptied, cleaned out, re-filled and restarted and that was the weekly cycle. [506]

This was known as Lump Pan Common, Dropped Common, or Weekend Common. [507]

Tests proved that common salt contained a high moisture content when processed than normal table salt an indication of the process used to dry the salt.

	Table Salt	Common Salt
Carbonate of Lime	0.03	0.062
Sulphate of Lime	1.438	1.034
Chloride of Calcium	0.063	Nil
Chloride of Magnesium	0.064	Nil
Sulphate of Magnesium	Nil	0.048
Sulphate of Soda	Nil	0.076
Sodium Chloride	98.23	91.95
Moisture	0.30	6.97
TOTAL	**100.125**	**100.140**

*Iron traces found in each sample

**Aluminium not detected

Table 8.2: Salt from Ingram Thompson & Sons, Marston, 30th Sept 1910

Common Salt for Meat

A temperature of 130–140°F (54.44–60°C) produced large grained flaky salt suitable for the preserving of meat. This was vital in the period prior to electric refrigeration when ice was expensive to use (it was usually pack ice derived from Norway etc. and kept in ice houses. This was generally the preserve of the elite).

Common Salt for the Chemical Industry

'Common salt' was used in the chemical manufacturing industries. It was produced at a temperature of about 160–170°F (71.11–76.66°C).

The basis for Cheshire's historic chemical industry is its close association with salt. Salt has been used in the production of soap since the early medieval period. Soap was formed by the boiling of fats with strong alkali. When the reaction was complete salt was added which precipitated the soap. [508]

The Leblanc process was developed by Nicholas Leblanc in 1789. The process created 'saltcake' (Sodium Sulphate, Na_2SO_4) on a commercial scale, by the reaction of Salt (NaCl) and Sulphuric Acid (HS_2O_4). This was then reacted with calcium carbonate (Limestone, $CaCO_3$) to create Soda Ash (Na_2CO_3) and ultimately soda crystals. The process produced hydrochloric acid (HCl) and calcium sulphide (CaS) as waste products and was a highly polluting industry. In 1823, James Muspratt of Liverpool used the Leblanc process in large-scale commercial production of soda and developed the Liverpool alkali industry for over a century. He used coal from the south Lancashire collieries and salt from Cheshire, and had a ready market in the Lancashire textile industry. [509]

The development of the ammonia-soda or Solvay process by two brothers Alfred and Ernest Solvay in 1861 developed a cleaner way to produce soda ash. Sodium Chloride (NaCl) was reacted with slaked lime ($CaOH_2$) to produce soda ash (Na_2CO_3) with a harmless by-product of calcium chloride ($CaCl_2$). In 1872, Ludwig Mond and John Brunner acquired the British rights to the Solvay process and opened the plant at Winnington. [510] Like the Leblanc process it was reliant on vast quantities of chemical grade common salt.

506 CRO D8645 LSW Henry Thompson, oral history transcript, 1988.
507 Twigg 1993, 6–7.
508 Morrison, n. d. (a).
509 Morrison n. d. (a).
510 Morrison n. d. (a).

The Castner-Kellner process was developed in the 1890s to create Caustic Soda (Sodium Hydroxide, NaOH). This also produced chlorine (Cl). These two chemicals are used in a variety of common industries including pharmaceuticals, detergents, deodorants, disinfectants, herbicides, pesticides, and plastics. [511] This used sodium chloride but in the form of brine rather than salt. The first plant was developed at Weston Point in 1897 and a pipeline laid from Marbury in 1897. [512] Salt declined in importance in the chemical industry and became rapidly replaced by brine after *c.* 1900.

Common Salt for the Pottery Industry

Salt in the pottery industry was used to produce salt-glazed ware. The technique was originally undertaken in Germany and known as German Stoneware. It was imported to Britain and was commonly produced in the Staffordshire Potteries. [513] The process involved the introduction of Common Salt to the kiln which would burst into a cloud of vapour that swirled around the clay pots. The glassy surface is formed as the sodium oxide in the salt reacts with alumina and the silica in the clay to produce sodium alumina-silicate: the distinctive salt glaze. [514] Jonathan Thompson stated that when coal came up from Stoke-on-Trent on barges for the Lion Salt Works, dirty salt was sent back down as a back-load for making salt-glazed pottery. [515]

Fishery Salt

A temperature of 100°F produced a coarse, hard, slow-melting crystal considered ideal for fisheries. The salt was used to pack and salt fish when it was caught at sea or when the catch was returned to dock in order to preserve the fish. The decline of the production of fishery salt can be directly attributed to the invention of refrigeration units.

Originally, the Alliance Salt Works had a series of five fishery pans (to the east outside the site boundary), slightly later, four 'fishery pans' at the Lion Salt Works (see site development). These were different to the pans seen today. They were entirely open as visible on aerial photographs from 1947. They had no stove houses (salt was not dried in blocks). The salt was skimmed directly from the pans onto the wooden hurdles at the side and allowed to drain. It was then shovelled into barrows. It was taken to the salt warehouse and allowed to dry naturally in large piles of salt. The Coronation Salt Store (on the west side of Ollershaw Lane) is an example of one of these salt warehouses.

Fishery salt took much longer to produce and after several days the salt was too thick to rake-up and formed a crystalline mass.

Waste Salt

Even waste salt was sold off where it had discoloured or become tainted. It could be used for fertiliser or in the pottery industry (see above):

Send me a sample of soiled salt as we have an enquiry by wagon. They do not want anything but discoloured salt. If there are cinders or straw in it they will not buy. [516]

Running the Salt Works: The Supply Chain

The nature of the day-to-day running of the works is revealed by a variety of sources. These include a series of receipts found in the attic of the Red Lion Inn that date to 1910.

In addition ledgers of repairs and orders were produced for the works. They reveal the cross-section of the local and national economy that the Lion Salt Works relied on to procure materials to keep both the Lion and Sunbeam Salt Works functioning.

511 Bommaraju *et al* 2000.
512 Morrison, n. d. (a).
513 Cochrane 2001, 9–30.
514 Cochrane 2001, 8.
515 CRO D8645 LSW Jonathan Thompson, oral history transcript (2) *c.* 1989.

516 CRO D8645 LSW 90/229/128: Delivery Note, 12 October 1908.

Type/ Company	No of Receipts	Percentage
S. Moreland, Iron Merchants	102	55%
Other Iron/ Tube Manufacturers	11	6%
Builders/ Wood Merchants	12	6.5%
British Petroleum	29	15.5%
Coke/ Coal/ Tar	5	2.5%
Other	27	14.5%
TOTAL	**186**	

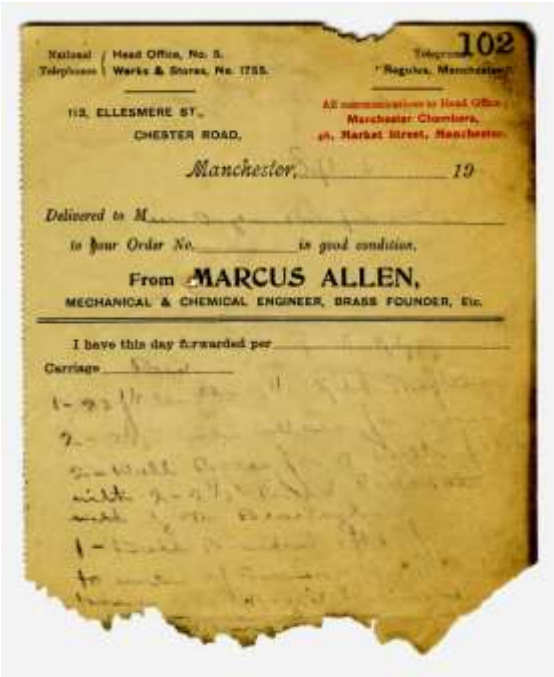
Table 8.3: Table of receipts for materials from the Lion Salt Works in 1910

Engineering: Steam Engines and Boilers

There are known to have been three steam engines on site. The earliest was made by Craven Brothers of Manchester and is now lost. A later engine was made by Abraham Lord of Rochdale, and is now in storage. It had been set up outside the Smithy building in the 1980s following the sale of an engine, which has no historical record. These included Marcus Allen, Mechanical and Chemical Engineers of Manchester who repaired the steam engines (8.32).

The earliest (Lancashire) boiler on the site was made by Galloway's of Manchester; it still survives under the Brine Tank. A later (Cornish) boiler, now housed in a shed adjoining the Manager's House, was made by William Lord of Bury, whose engineering works is still standing though it is now used for general engineering. George Tinker, Boiler Maker, Manchester Road, near Hyde Station, provided a boiler 30'7" for the Sunbeam Works on 16th August 1910. [517]

517 CRO D8645 LSW Collection of Receipts from 1910, 16 August.


102
Head Office, No. 5.
Works & Stores, No. 1755.
112, ELLESMERE ST.,
CHESTER ROAD,
Manchester, 19
Delivered to M.
to your Order No.
in good condition.
From MARCUS ALLEN,
MECHANICAL & CHEMICAL ENGINEER, BRASS FOUNDER, Etc.
I have this day forwarded per
Carriage

8.32: Receipt from Marcus Allen whom repaired the steam engine in the pump house.

More specific engineering material was provided by a range of other companies. Isaac Storey and Sons Ltd, Empress Foundry, Manchester provided a number of specific castings in 'Admiralty Gun Metal, off three patterns and one core box'. These were of a mixture of 88% copper, 10% tin and 2% spelter that suggests a more durable material than brass and that they may have been associated with one of the steam engines. [518]

Brine or steam pipes were provided by specialist tube contractors including Edwin Lewis and Sons, Patent Iron Tube Works, Wolverhampton [519] and Monk Hall and Co Ltd, Tube Works, Warrington. [520]

By the late 1930s, the Northwich boat builders W. J. Yarwood and Sons, who carried out repairs on the Thompson's boats, were also supplying parts for and carrying out engineering tasks on machinery at their salt works.

October 1939:-'Opening out check valve – re facing valve Seat Flange; Supplying and machining new Delta Bronze Spindle – refitting up valve'

518 CRO D8645 LSW Collection of Receipts from 1910, 15 July.
519 CRO D8645 LSW Collection of Receipts from 1910, 14 December.
520 CRO D8645 LSW Collection of Receipts from 1910, 2 September.

May 1940:- 'Dismantling Shaft for Salt Mill Rollers; Supplying new cast for Roller with Shaft cast in etc. Sundries. Supplying and machining new mild steel Spindle for Donkey Pump Side Valve'

Ironmongers and Iron Merchants

Joseph Parks of Northwich was involved in the supply and installation of plant including iron plates for the repair of the salt pans from soon after the establishment of the Lion Salt Works. Born in 1834 in Wincham, the son of a farmer, Joseph Parks was a boiler maker by trade, being described as Boiler Maker Master in 1871, when he was living in Wincham Lane, Wincham. In 1896, when he was operating from Penny's Lane, Northwich, he was described on his letterhead as: '*Maker of Land and Marine Boilers, Bridge Girders, Iron Roofing, Gas Holders, Chemical Vessels, Ships' Water Tanks, and contractor for the erection of every description of Salt-Making Plant, also for Sinking Shafts for Brine, Rock Salt, and Wells for water.*' [521] In the same year he provided quotations for supplying a fine salt pan to the Lion Works.

8 January 1896

I will undertake to build fine salt making plant to specification of yesterday date for £560, you to find remainder of bricks required, dress old ones on the ground & deliver sail (for raising stove & pan) in boats alongside wharf (sic) *at Marston, also sand for mortar, I to discharge same, I have not reckoned for brine or water pipes, not knowing distance these will have to be carried.*

10 January 1896

I will build fine salt pan at Marston & find all material for pan & furnace work only as per specification given to you on 7th inst for £114. Net.

13 January 1896

The price of the boiling pan may seem to you out of proportion to the common ones, but please consider that this boiling pan requires the same weight and labour (sic) *in furnace work exactly, what I have taken off is £44-10-0 for the 30ft of back end of common pan, this is the lightest part, while the boiling pan is nearly all strong in the bottom, I will do my best to meet you in price. Would it suit you to find your own furnace work and your smith do the fire doors and frames same as the other 3 Marston pans, in this case I will do the pan and find all material for £96…*[522]


JOSEPH PARKS & SON,
Makers of
Contractors for the erection of every description of Salt Making Plant
also for Sinking Shafts for Brine Rock Salt and Wells for Water.
MANCHESTER ROAD,
NORTHWICH.

8.33: Joseph Parks and Sons continued to install plant for the salt industry throughout the 20th century. This included the plans for Pan and Stove Houses 4 and 5 in the 1950s and 1960s. This quotation dates to 1919 when the lump salt pans were replaced at the Lion Salt Works.

In 1902 the business was listed as Joseph Parkes and Sons, Manchester Road, Northwich; the sons carried on the business after their father died in 1906 (8.33). The works has been demolished and is now the location for B and Q, Northwich.

Samuel Moreland, Iron Merchant, of 21, Witton Street, Northwich produced the single largest number of receipts (8.34). They provided general ironmongery that included orders such as '1 x square heating stove, 1 x galvanised steam pipe and stove'; '2 dozen 2½" x ½" Bolts and Nuts, Hard Saw File, Duplex Gauge Glasses' or 1 x ½" Riddle, 1 x length of 2" steam tube, 15'9" long. Of the 186 receipts 102 (55%) came from the company. [523]

521 LSW NOCMS 1986/3783/1/7.

522 LSW NOCMS 1986/3783/8/7.

523 CRO D8645 LSW Collection of Receipts from 1910.

Their advert stated that they were 'Furnishing and General Ironmonger, Hot Water Fitter, Locksmith and Bell Hanger. Wholesale dealer in Grates, Ranges, Boilers, Ovens, Spouts, Gutters, Galvanised Iron, Roof Felting, Steam Fittings of Every Kind, Repairs attended promptly'.

8.34 A series of receipts found in the attic of the Red Lion Inn showed the network of local firms supporting the salt work from 1905-1910. Examination of the business ledgers revealed the same firms being used over 50 years later, an indication that the Thompson's like other salt-makers were inherently conservative in their choices.

Other specialist metalwork was provided by Holden and Brooke Limited of the Sirius Works, West Gorton, Manchester and the Ralph White and Co, Novelty Ironworks, Northwich. [524] A large order of brackets, buckets, gutters, nuts and bolts, pipes etc… was placed with Mungal Foundry in Carron, Stirlingshire. [525] By the 1930s the Widnes firm of Todd Brothers was supplying general ironmongery; it was an association that continued well into the 1960s.

In August, 1971 John B Fletcher and Sons, Broken Cross, Rudheath, repaired Pan No. 4. At the same time they modified the oil tank, suggesting that it had been recently delivered to site. The oil firing system was electronic for the pan gas burners, undertaken by Manweb, Northwich. [526] Fryer's Engineering Ltd, Stoke-on-Trent responsible for repairs on the automatic scraping and drying mechanism in 1971. [527] The submersible pump was repaired by Wyatt Bros of Whitchurch in 1973. This included repairing the pipework to the brine tank and the rising main. [528]

8.35: A number of receipts related to the purchase of fuel at the works. Many of the Thompson's narrow boats would have been petrol driven.

Builders

General building material was provided by Moore and Brock, Builders' and Contractors' Merchants, Barons Quay, Northwich. [529] Joseph Parks and Sons of Manchester Road, Northwich provided doors for the works. [530] Peter Taylor and Sons, Leftwich Saw Mills, provided timber including considerable quantity of 210 feet (64m) of poplar, for cladding the pan houses (8.35). [531] This company also provided 44 salt tubs and 200 angle tubs.

524 CRO D8645 LSW Collection of Receipts from 1910.
525 CRO D8645 LSW Collection of Receipts from 1910.

526 LSW NOCMS: 1986/3783/3/5.
527 LSW NOCMS: 1986/3783/3/5.
528 LSW NOCMS: 1986/3783/3/5, 71.
529 CRO D8645 LSW Collection of Receipts from 1910.
530 CRO D8645 LSW Collection of Receipts from 1910.
531 CRO D8645 LSW Collection of Receipts from 1910, 21 February 1910 and 13 June.


No. 1424 PETER TAYLOR & SONS,
LEFTWICH SAW MILLS,
Northwich.
INVOICE
PLEASE RECEIVE
213 sq feet received

8.36: Peter Taylor and Sons of Leftwich provided timber for the buildings and made salt tubs for the works.

One ton of mortar was delivered to the Sunbeam Works and received by 'Alf Carter', either the foreman or the site bricklayer. Mr Stelfox, the clerk at the Lion Salt Works, ordered '*2lbs of very brilliant red paint*' and '*3lbs of sky blue paint*'. [532] The Northwich Gas Company delivered 120 gallons of tar to the works and one month later a further 40 gallons of tar. [533] This may have been used to preserve wood on the site or coat the roof timbers. The sides of the buildings were preserved with creosote. Josh Hardman Ltd, Chemical Works, Milton, Staffordshire stated: '*We have today loaded and forwarded out boat Ernest with creosote, particulars to follow*'. [534]

By the 1970s the Castle Brick Co, Buckley, Flintshire, provided bricks to the works. James Littler and Sons, Baron Quay Sawmills continued to provide timber for the Lion Salt Works in the 1970s. [535]

Boatyards

Repairs to the Thompsons' boats were carried out at the boatyard of W. J. Yarwood and Sons on the River Weaver, Northwich. This yard had been started by John Thompson senior and was recorded on the tithe map of 1846 for Northwich and Northwich Castle. Sold to pay off a potential bankruptcy, it was purchased by William James Yarwood in 1896. The yard has since been redeveloped for industrial and office use and only surviving element of the site is a basin of the Weaver Navigation. Repairs to the Thompsons' boats were recorded throughout the late 1930s and 1940s, both narrow boats and the two Weaver flats the Amelia and Constance. The final boat repair carried out by Yarwood's for the Thompsons was an overhaul of the Constance, which was entered in the ledger on 31 December 1953.[536]

532 CRO D8645 LSW Collection of Receipts from 1910, 17 September and 13 October.
533 CRO D8645 LSW Collection of Receipts from 1910, 7 May 1910 and 10 June.
534 CRO D8645 LSW Collection of Receipts from 1910, 13 January.
535 LSW NOCMS: 1986/3783/3/5, 21.

536 LSW NOCMS 1986/3783/1/12.

9. TRANSPORT

The transport to the site went through change over time that correlated with the wider change in transport.

River and Canal Transport

Much of the 19th-century open-pan salt works in Northwich developed along the line of the River Weaver and the Trent and Mersey Canal. Initially, the Alliance Works and the early Lion Salt Works relied on the canal network to transport coal and salt along the canal to the Anderton Boat Lift and down the River Weaver. The 19th-century maps suggest that coal was delivered and salt removed from the open pans of the Alliance Works from a private basin. Likewise coal was delivered directly into the Lion Salt Works and salt transhipped away.

The River Weaver

The main route of transport utilised the River Weaver (9.1). The River Weaver rises in the Peckforton hills, and flows across the Cheshire plain, joining the Mersey near Frodsham. It has played an important part in the development of the salt industry as it has provided an arterial route to the ports in Liverpool, Weston and Runcorn. It was improved in the 18th century, for two reasons. Firstly it allowed coal to be transported from the south Lancashire coalfield around St Helens. The transition from wood to coal in the late 17th century meant that coal was required in ever increasing quantities. Secondly, the discovery of rock salt at Marbury, north of Northwich had led to the increased exploitation of Rock Salt deposits. The rock salt was transported to refineries on the Mersey Estuary. [537]

The River Weaver was made navigable by an act of 1721, which involved deepening the channel, by inserting twelve wooden locks. Many rock salt pits and salt works were opened along its banks, especially in Northwich and along the Witton brook. Coal and salt dominated the early trade along the river. The new navigation was, however, poorly maintained. This resulted in the collapse of a section of the river at the Northwich Lock in 1759 that caused the river to be split in two. A new act in 1760 required the river to be maintained at a depth of 4 feet 6 inches (1.4m) and widen the locks to 18 feet (5.5m). The river was put in the hands of the River Weaver Trustees and remained in their hands until 1895. The boats were initially hauled by hand back up the river but a towing path was added in 1795 to allow horses to undertake the task. [538]

Trade rose markedly in the early 19th century. Of the 16,500 people estimated in 1817 to be supported by the salt industry, 5,000 were employed on the rivers and canals, and a further 5,000 were indirectly employed as 'ironmongers, shipwrights, carpenters, bricklayers, ropemakers and sailmakers'. [539] River transport increased greatly from the 1860s due to the introduction of steam barges. In 1863 H E Falk, the biggest exporter of salt in the mid-19th century, introduced steam barges to the River Weaver. This altered the balance of power on the River Weaver, as they were expensive to purchase and maintain and only merchants and larger proprietors could afford to keep them. [540] In order to take advantage of these vessels an improvement scheme was undertaken between 1871 and 1891. By 1885, 1,000,000 tons (1,016,046 tonnes) of salt per annum were carried down the Weaver. A report in *The Daily Graphic* stated:

About two-thirds of the salt manufactured is sent down to Liverpool and the Upper Mersey ports of Runcorn and Weston, which latter lie at the point where the canal and river enter the Mersey. The salt is conveyed in lighters called flats. These carry from eighty to 300 tons. At one time they were all sailing flats… …Now a large number of them are propelled by steam, and they tow others called barges. At times 4,000 tons of salt will go down to Liverpool on one tide. [541]

Weaver Flats were shallow-draft, broad-beamed vessels, originally 50–80 tons in size gradually increasing to 88–100 tons. In the early part of the

537 Rochester 1975, Part 3, 20–21.

538 Rochester 1975, Part 3, 20–21.
539 P.P. 1817 S.C. Rock-Salt in the Fisheries iii, 142.
540 Didsbury 1977, 153–154.
541 *The Daily Graphic*, 6 March 1890, 4.

19th century, working the flats was a family occupation. Women and children lived and worked on the vessels, steering, setting the locks and 'trimming', loading the boats. Flatmen were paid as part contractors at this time working on a shares system of payment, receiving a share of the freightage rate per ton. Unless he employed his family he would have to pay a 'hand' to work the boat, the lads for loading the boats, haulage of the boats down the River Weaver from Winsford or Northwich to Weston Point, and salt heavers to unload the salt at the docks in Liverpool or Birkenhead. [542] Working with the family would reduce these costs dramatically and hence increase the flatmen's profits. Many of the weaver flats were built in Northwich. Yarwood's yard [on the left bank of the Weaver by the Town Bridge], the largest, rivalled only by that of the nearby yard of Isaac Pimbloot and Sons, was to construct nearly a thousand vessels of bewildering variety of types until its closure in the early 1960s. [543]

Further trade increases occurred with the construction of John Brunner and Alfred Mond's Alkali works at Winnington in 1873, which transported caustic soda and soda ash down the river. [544] The chemical industry was largely revolutionised in the late 19th century when brine was substituted for salt. [545]

By the end of the 19th century river transport was in decline. Rail transport had begun to take the place of the river. Secondly the building of a pipeline to Weston Point further reduced the use of the river. [546] The Marbury Brine Pipe was laid from Marbury to Weston in 1882 by the Mersey Salt and Brine Company. After the Salt Union took over the works it expanded the vacuum plant at Weston in 1911 including improving the pipeline. It was met with opposition as it allowed salt to be produced outside the 'Salt District'. [547] The Weaver Navigation Trust was formed in 1895 in order to increase the influence of the industries along the river. They continued to administer the Trust until the river was nationalised in 1948 under the auspices of British Waterways. [548]

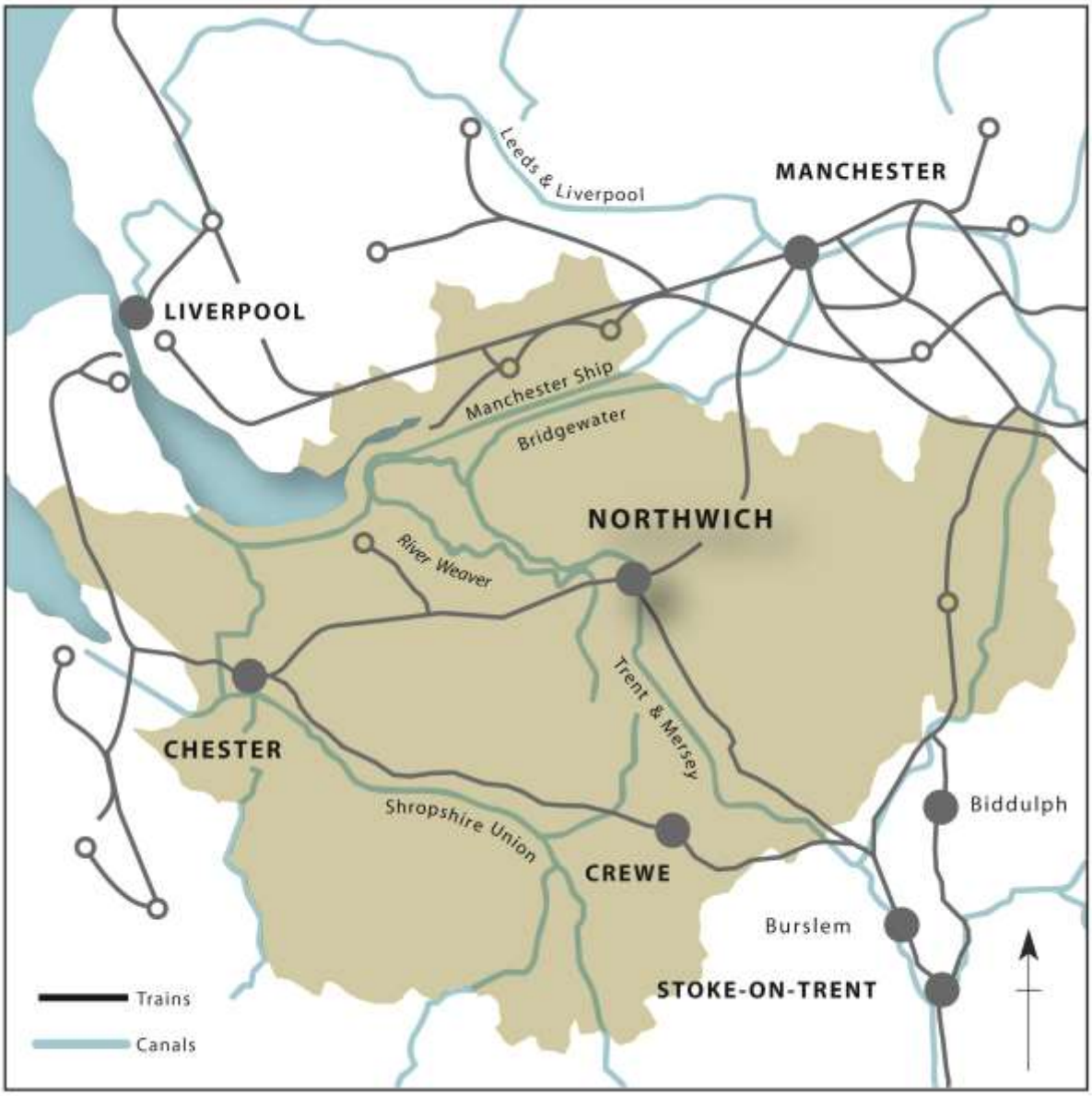
The Trent and Mersey Canal

The Trent and Mersey Canal, engineered by the great James Brindley, was open throughout by 1777 and connected the River Trent with the River Mersey (9.1). Amongst the main supporters of the canal were the pottery manufacturers led by Josiah Wedgwood, who realised that improved transport would benefit the Potteries. For many years there was no co-operation between the Weaver Navigation Trustees and the Trent and Mersey Canal. The Trustees were deeply suspicious and opposed the scheme as they believed it would damage profits. The Weaver Act of 1808 forbade the transhipment of any goods between the waterways except white and rock salt; it was not repealed until 1825. [549]

The canal itself was built to 'narrow' dimensions, to suit boats 70 feet (21m) long and 7 feet (2.1m) wide. Narrow canals were less costly to build and used less water than canals built to carry vessels of a size common on the river navigations, such as the River Weaver. As well as constructing many locks to take the canal up and down hills, Brindley had to build long tunnels at Harecastle and Preston brook, and shorter ones at Barnton and Saltersford. The canal eventually came into the ownership of the North Staffordshire Railway, who actively promoted it and invested money in doubling the locks, to allow an uninterrupted flow of traffic.

Boats could carry 25 tons (25.4 tonnes) or more, pulled by a single horse, often direct from the works. As the network of river navigations and canals spread, prices of coal dropped dramatically, making industrial expansion viable.

542 Didsbury 1977, 151–152.
543 Guthrie 1996
544 Rochester 1975, Part 3, 20–21.
545 Calvert 1915, 510.
546 Rochester 1975, Part 3, 20–21.
547 Edmondson, Colin n.d. Marbury Pipeline (CP/MARB/E)
548 Rochester 1975, Part 3, 20–21.
549 Rochester 1975, Part 3, 37.



9.1: The site in Northwich lay on the Trent and Mersey Canal a short distance from the River Weaver. The Northwich Lines ran to the mid-Cheshire branch and connected with the principal cities in the north-west.

Salt works sprung up along the canal at Lawton, Wheelock, Middlewich and Northwich. The salt was transhipped down the canal to Anderton. The canal comes very close to the River Weaver at Anderton, but it is 15m (50 feet) above the level of the river. To allow transit between the two waterways, chutes, cranes and an inclined plane was erected and quays built on the river bank. [550] This particularly benefited white and rock salt manufacturers in the Wincham and Marston districts who could transport their goods directly to waiting flats below.

The Anderton Lift was originally designed to circumnavigate the Bridgewater Canal, which the trustees of the Weaver Navigation canal were concerned might fall into the hands of a railway company. An act of parliament was passed in 1872 and the lift was designed by Edwin Clark and carried out by Emmerson Murgatroyd and Co Ltd. The lift was completed and opened for traffic on the 26th July 1875. [551] The decline of canal traffic was prolonged but canals continued to carry coal and salt until after the Second World War. [552]

550 Rochester 1975, Part 3, 37.

551 Tew 1984, 75.
552 Rochester 1975, Part 3, 37.

19th-Century Transport

From 1790, many of the works in Marston were served by a canal that ran down to the River Weaver. This was so adversely affected by subsidence that by 1811, the lock and weir had been removed. By the late 19th century there was a 60-foot depth of water. The Alliance Works was served by a tramway to the Cheshire Lines, Northwich Salt Line. Earlier than this it appears to have run not onto the main train line, but instead to a standing on the Ashton Flash. A plan of the Witton Brook in 1864 shows 'Mr Thompson's Stage', down by Witton Bridge served by 'Mr Thompson's Tramway' that runs back in the direction of the Alliance Works. [553]

The Thompsons maintained a small fleet of boats in which to transport their goods. Twenty-two boats belonging to John Thompson are recorded in the Weaver Navigation Register of Weighed Flats between 1859 and 1888. [554] Some of these, together with several others that do not appear in the register, [555] are recorded in the Thompsons' ledger for 1884–1889, [556] giving a total of 29 boats that can be identified from these two sources prior to the sale of the company to the Salt Union. The ledger also records the weight of the loads, which shows that several of the boats were carrying slightly over the 100 ton mark while others were able to hold considerably in excess of 100 tons; these included the Edward (105 tons), Elizabeth (111 tons), Herald of Peace (140 tons), Jonah (107 tons), Lord Stanley (190 tons) Riversdale (232½ tons) [557] and Westmoreland (170 tons). None of these was at full capacity; in the Register of Weighed flats the scales for the Riversdale and Westmoreland went up to 300 tons

One of the last boats to be made for the Thompsons before they sold out to the Salt Union was the 'Nautilus', which was built for Henry Ingram Thompson by John Woodcock of Northwich and launched at the beginning of June 1988 (9.2). It was a steam ship with dimensions of 90ft (27.4m) x 21ft (6.4m) x 10ft (0.91m) deep and was able to carry 250 tons of salt along the River Weaver. [558] It had a steam winch and a derrick for loading and offloading the cargo; the winch is now located in the Pump House, according to Jonathan Thompson. The boat was sold by Henry Ingram Thompson in 1892 after the sale of his salt business. [559]

9.2: The Nautilus on an inaugural outing with the Thompson family. It was reported on in the Northwich and Winsford Guardian:

By invitation of Mr Thompson, a party of ladies and gentlemen, numbering about 70 boarded the steamer on Saturday morning, amongst others present being Mr and Mrs H I Thompson, Mr and Mrs A J Thompson, Mr and Mrs F J Thompson, Mr Jabez Thompson, Mr H Bratt and Miss Bratt, Mr T Capper, Ms and Mrs Cram, Mr C Forrest, Mr E T Ward, Mr and Mrs Woodcock, Mr W Such and children. The weather was beautifully fine, and the Nautilus' sail down the Weaver and Mersey as far as Eastham was greatly enjoyed by all. On the return journey several of the party landed in the Weaver Valley, and had a pleasurable ramble. Lunch and tea were provided on board by Mr Thompson. The Nautilus reached Northwich about seven o'clock, the trial trip having proved most successful in every respect. [560]

553 Calvert 1915, 321–322.
554 CRO LNW/4058/1. Ant, Caroline, Clare, Edith, Edwin, Elizabeth, Emily, Fern, Florence, Frankfurt, Fred, Helen, Henry, Herald of Peace, Jonah. Margaret, Mary, Rivendale, Polly, Vine, Westmoreland and William.
555 Edward, Harry, Isaac, James, Lizzie, Lord Stanley, Rebecca.
556 LSW NOCMS: 1986/3783/1/9.
557 Riversdale was the name of the house on Dobell's Road, Leftwich, in which John Thompson (Junior) and his family were living at the time of the 1881 census.

558 *Northwich and Winsford* 6 June 1888, 15 September 1988.
559 Thompson n. d. (*c.* 1985), 7.
560 Northwich and Winsford Guardian, 15th September 1888

Transport from the Lion Salt Works

In the early 20th century the transport of salt continued along the lines of the 19th century industry. Our understanding of these early years of the Lion Salt Works trade is greatly aided by the survival of delivery notes from the period between 1906 and 1910. In addition, extensive records of transport during the First World War were recorded in a series of ledgers.

Henry Ingram Thompson had begun to acquire boats to transport the products of the Lion Salt Works by 1 February 1894; [561] between then and 31 July 1895 seven of his boats are documented in the Weaver Navigation Register of Weighed Flats. [562] A ledger of 1909–1915 from the Sunbeam Works recording salt shipments and fuel distribution shows that the Thompsons were using over 100 boats during this period. [563] Most of these were narrow boats like the three Thompson boats, Sunflower, Thoughtit and Willie that were moored on the Trent and Mersey Canal, Marston, at the time of the 1901 census. The majority, however, seem to have been engine driven, only 18 being absent from fuel distribution lists. Loads ranged up to 31 tons.

These narrow boats were used to transfer salt from the works to one of the three principal vessels owned by the Thompsons in the early 20th century: the Constance, the Amelia and the Gowanburn. These were Weaver Flats, larger vessels designed to carry salt up and down the River

The Constance, which was in use by 1894, [564] was a steam ship as indicated by the suffix S.S. behind its name (9.3). The Amelia was a dumb barge towed behind the Constance. [565] Repairs were made to the S. S. Constance and Barge Amelia in 1945. [566] The Amelia was in use up to 16 December 1945 and the Constance up to 27 February 1954. [567] The Constance appears to have had a capacity of 265 tons (268 tonnes), and the Amelia a capacity of 145 tons (147 tonnes). [568] Ernie Williamson was the captain of the Constance until his retirement in 1950. [569]

It was in use up to 27 February 1954. Jack and Alan Kinsey Thompson eventually scuppered their boats on a sand bank in Wallasey and set fire to them. Parts of Constance were salvaged, in particular the mast which was reused in the Lion Salt Works as part of the derrick above the bore hole.

9.3: The 'Constance' was referred to in the earliest delivery notes dating from 1905-1910.

The Gowanburn was a dumb barge, which had been built in 1902. It alone had a capacity for around 300 tons (305 tonnes) of salt:

Dear Stelfox, The 'Gowanburn' will now do to be loaded in good time on Tuesday next with 280 tons of 2nd Fishery and not 290 tons. E.G.P. [570]

It was later purchased by Henry Seddon from Henry Ingram Thompson. Seddon normally worked it with the steam packet Weaver Belle built by W. J. Yarwood and Sons Ltd, Northwich, in 1900. The WeaverBelle could carry up to 200 tons (203 tonnes) and could tow another 250 ton boat. By

561 CRO LNW/4058/2, 709.
562 CRO LNW/4058/2: Amelia, Constance, Dauntless, Eleanor, Gladstone, Harvest Home and Riverside.
563 LSW NOCMS: 1986/3783/1/21.
564 CRO LNW/4058/1, 709, 718.
565 NOCMS 1986/3783/1/14 Journal from the Lion Salt Works 1937-1942
566 NOCMS1986/3783/1/13 Journal from the Lion Salt Works 1942-1947

567 LSW NOCMS: 1986/3783/1/19.
568 The Weaver Navigation Register of Weighed Flats
569 Thompson n. d. (*c.* 1985), 8.
570 CRO D8645 LSW 90/229/38: Delivery Note, 26 January 1907.

1960 both Weaver Belle and Gowanburn had been laid up and cargoes were being handled by the small motor vessel Purbeck. [571]

The Weaver Flats sailed between the basin at the Anderton Boat Lift and a variety of locations, principally the port at Liverpool. The competition for loading places at the Anderton boat lift was intense.

I do hope the Constance is finished and sailed for Liverpool. The Amelia must finish today Saturday certain and you must load all five boats and have them at Anderton for first thing on Monday morning. The Gowanburn will be there and must have a full cargo without delay. If you do not get all the boats down to Anderton for her [the Gowanburn], Seddon and A.J.I. etc… will monopolise the whole basin and it must be done. Now make the best arrangements you can for loading the boats on Saturday afternoon. JIT [572]

The competition for loading spaces led to congestion preventing the loading of the Thompsons' boats within the basin. Competition with neighbouring salt producers, such as Henry Seddon and Sons, was intense.

The Constance will be at Anderton, tomorrow Tuesday afternoon about 3.30. Have as many boats down as you can early as possible tomorrow get as much loaded in Constance tomorrow as you can. Seddon only got the order to load the 'Inflexible' late on Saturday and she almost put the Gowanburn out of action if indeed she has not done so. We want quick work with the Constance. JIT. [573]

In order to load the boats it was necessary to transport salt along the Trent and Mersey Canal to Anderton. This relied on a series of narrow boats that traversed the short route between the Lion Salt Works and the Sunbeam Works in Marston and Wincham respectively, a distance of two to three miles. The narrow boats had a capacity of 20–30 tons. *Used 3 or 4 horse drawn narrow boats (20 tonnes) each to take salt down to Anderton. Then loaded into the Constance, SS and Amelia, Dumb Barge.* [574]

The Gowanburn will be up tonight for 160 ton of Common Salt in bulk. Load her quick as you can say 5 ½ ton size boats. The Constance will be with you sometime tomorrow for the Factory filled and she must be loaded on Saturday. Make double drafts with stove pans on Saturday and make every ounce you can. JIT. [575]

The works had its own fleet of narrow boats carrying 30 ton consignments of salt to the waiting Weaver Flats and barges (9.4). They traversed the short route of two to three miles between the Lion Salt Works and the Sunbeam Works in Marston and Wincham to the Anderton Boat Lift. Their names were Duke, Earl, Ernest, Tempest and Typhoon.

9.4: Unloading salt from a narrow boat into a handcart at Anderton. This boat belonged to Henry Ingram Thompson. The photo was taken in the 1930s. [576]

The salt was unloaded from the holds into waiting barrows and tipped down the salt chutes (9.5, 9.6). The handcart was wheeled along a high timber gantry until it was almost above the boat on the River Weaver below where the salt was tipped down a chute. Buried remains of salt chutes form part of the Scheduled Monument of the Anderton Boat Lift (SM no. 1021152).

At the bottom of the chute the salt was loaded into a Weaver 'flat' (9.7). Once the hatch boards were replaced and covered with a tarpaulin the boat

571 Faulkner 1992, 54–59.
572 CRO D8645 LSW 90/229/63: Delivery Note 30 August 1907.
573 CRO D8645 LSW 90/229/83: Delivery Note 10 July 1908.
574 CRO D8645 LSW Jonathan Thompson oral history transcript (3) *c.* 1989.
575 CRO D8645 LSW 90/229/91: Delivery Note 27 July 1908.
576 West Cheshire Museums, CMS.P1995.4027

would be taken down the River Weaver and across to Liverpool, where the salt would end up in an ocean going ship for export (Weaver Hall).

9.5: Barrows were taken along a gantry and poured down the chutes to the waiting Weaver flats. The photo was taken in the 1930s. [577]

9.6: The gantry and the chute from the side, with the Anderton Boat Lift in the background. [578]

9.7: Here the salt is deposited in the Thompson's boat 'Constance' in the 1930s. Ernie Williamson the flats captain watches smoking a pipe, whilst Sam Riding leans against the handrail.[579]

[577] West Cheshire Museums, CMS:P1995.578
[578] West Cheshire Museums, CMS: P1995.4025
[579] West Cheshire Museums, CMS.P1995.576

9.8: The Thompson's Weaver Flat 'Constance' below the salt chutes at Anderton. Ernie Williamson the captain stares out from the photo. [580]

The closure of the lift could potentially hinder the loading of the boats, even though the Thompsons did not rely on its operation.

The Gowanburn will be up to load a full cargo on Thursday Evening. Common Salt. Please have all boats [narrow boats] loaded ready for her. Please find out if the Back Salt loading will be hindered whilst the lift [Anderton Boat Lift] is stopped and if so to what extent. JIT. [581]

The transhipment chutes remained in use until 1940. By then all the salt was being carried in white cotton bags. These were not suitable for the rough treatment the chutes involved. The narrow boats now used the Anderton Lift, which had opened in 1875, to reach the river and lie alongside river craft in Anderton basin to tranship the bags. [582]

[580] BW192-3-2-1-30-36 (2), Courtesy of the Canal and River Trust, Waterways Museum, Ellesmere Port.
581 CRO D8645 LSW 90/229/17: Delivery Note, 3 April 1906.
582 Faulkner 1992, 54–59.

To assist the boats tranship their salt cargoes at Anderton, the Trustees of the Weaver Navigation organised a salt loading gang. In the 1920s this compromised six men and was employed by the traffic of three producers, Seddons, Ingram Thompson and Sons, and Alfred J. Thompson. [583]

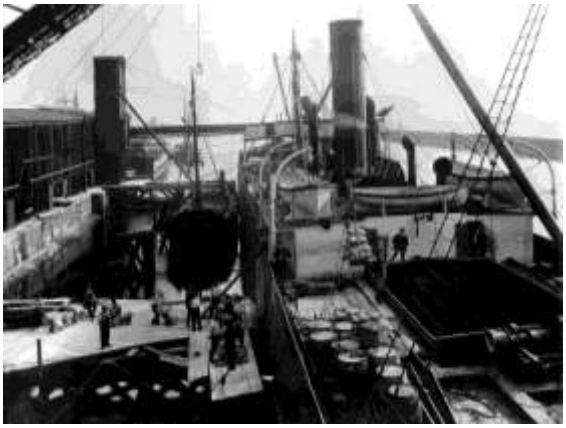
The flats were filled with both bulk common and fishery salt, directly into the hold and also by passing factory filled sacks of salt down the chutes.

Dear Alan, As far as I can see at present we shall have a great many orders for Common Salt in sacks filled at the [Lion Salt and Sunbeam] Works for Manchester and Liverpool also….Can you arrange to fill any sacks on top of the salt and send the sacks down a shoot from the Runway into the boats. I think what we want is to be able to get more men filling, that is to be able get round the Salt Letter. JIT. [584]

The Thompson's had a warehouse at the Anderton Wharf to allow storage prior to loading. This allowed salt to be loaded directly into the boats when no other salt was available, but also allowed production to continue at the works when there was overcapacity in the stores there. This partially collapsed into the Anderton Basin in 1897 during a landslip. [585] It is not clear if it was used after this, but it is likely that the Coronation Salt Store was built afterwards to compensate for the lack of storage space. It appears this was the warehouse referred to be Jack Thompson in 1908:

To relieve the Lion Works you may commence loading Amelia tomorrow. Father [Henry Ingram Thompson?] thinks you better load a boat of dry salt out of the warehouse first and avoid further damage. JIT. [586]

The Flats sailed down the Weaver to Liverpool, Manchester or Weston Point, Runcorn (9.9). They were reliant on favourable tides: *'The Constance must catch tomorrow afternoon tide certain'. JIT* [587]



9.9: Loading salt from a Weaver Flat onto an ocean going steam ship at Weston Point. The salt sacks are being lifted by a crane into the hold of the larger ship. [588]

The other option was to be towed down the river by a steamer.

Confirming conversation per telephone the Mountaineer (Salt Union Barge) must be loaded with 200 tons good seconds Fishery Salt by four o'clock on Monday certain. There will be a steamer waiting at Anderton at that hour to tow her down and the steamer she has to discharge into will be ready at Weston on Monday night. All the loading in the way of this must stand back. JIT. [589]

When all three boats were at full capacity the Thompson's relied on other companies to transport their salt.

You must get the Gowanburn's cargo from Middlewich quick despatch. Get boats from anywhere you can and try to have all the salt down to be loaded into her on Thursday. [590]

The Northwich Carrying Company Flat 'Harold' will be at Anderton to load our salt about noon on Monday next. [591]

The Thompson's Flats would be loaded by their own men and it was common to load the flats they

583 Faulkner 1992, 54–59.
584 CRO D8645 LSW 90/229/135: Delivery Note, 14 April 1909.
585 "Landslip at Anderton 1897" BWWN3/19 1897, The Waterways Trust, David Owen Waterways Archive
586 CRO D8645 LSW 90/229/24: Delivery Note, 14 June 1906.
587 CRO D8645 LSW 90/229/109, Delivery Note, 24 September 1908.
588 West Cheshire Museums, CMS:P1995.833
589 CRO D8645 LSW 90/229/87, Delivery Note, 22 July 1908.
590 CRO D8645 LSW 90/229/166: Delivery Note, 3 May 1910.
591 CRO D8645 LSW 90/229/18: Delivery Note, 26 May 1906

would employ. However, it was clear some flats continued to adopt the shares system that originated in the early to mid-19th century, where a share of the profit from transporting the salt would be earned by the crew. By the late-19th century the number of independent watermen had decreased rapidly due to the advent of steam driven flats run by the bigger companies. The use of the shares system had declined and flatmen were as likely to be employed on wages. [592] Some crews still clearly existed, however.

Load Constance tomorrow Tuesday certain. Load 'Galatica' SS and 'Gowanburn, Wednesday and Thursday. Salt is ordered from Electrolytic. Get names of boats despatched tomorrow and gauge carefully. Get all the men you can to work at Anderton. The Electrolytic load their own [crew load the weaver flat themselves]. [593]

Some salt continued to be transported by narrow boat but made a very small proportion of their capacity. On occasion salt was transported via the canal all the way to the docks at Runcorn. However, this appears to have been the exception as opposed to the norm.

…load the Constance a full cargo half clean Coarse Common Salt and half clean Seconds Fishery Salt no big lumps or saggars to be put in under any account unless they are taken. We shall also want one Canal boat sending to Runcorn Dock with this quality, and the boat will have to go by the canal and not by the Weaver. JIT. [594]

By the late 19th century the steamer was fast driving the sailing ship out of the carrying trade. '*Instead of every little port obtaining a few cargoes during the year by sailing vessels', observes an authority on the trade, 'some central and convenient port will be chosen and a line of steamers established to carry to it. The West African trade is becoming entirely a steam trade*'. [595]

When the salt reached its destination it was accounted for at the dock. Any error in loading would show up in the accounts and cost the Thompsons money:

Your letter of the 30th September giving the detailed numbers of bags shipped for 'Manchester Investor' SS does not agree with the account we have received. From Manchester from your letter gives 'Boats' 1885; Constance 1315; Total 3200. Whereas the ship counts to Boats 1876; Constance 1338; Total 3214. Consequently we have lost 14 bags of salt and will ask you to be more careful in your loading in future as the above difference is a clear loss and we can only invoice 3,200 bags and have to forfeit the other 14 bags. [596]

Although the Thompsons would sometimes loose out because of the counting of their loads when shipped, they were not beyond taking advantage of lax accounting:

The name of the steamer is the 'Batsman' loading at the Weston Dock for the 120 tons 2nd Fishery Salt. Please instruct the boatmen not to tell them at Weston what weight they have in. If they are obliged to tell the weight they are to say more than they have got in. [597]

The flats which convey the salt from the works down to Liverpool, after discharging their loads there, return up the Mersey to the Sankey Canal where they procure a load of coal for back freight. In 1806 70,580 tons (71, 713) were taken to Northwich, Witton and Anderton and a further 36,460 (37,046 tonnes) tons to Winsford, making a total of 107,040 tons (108,758 tonnes). Saltworks at Lawton, Roughwood, Wheelock and Middlewich procured their salt from the Staffordshire Colleries, via the Stafford Canal. [598]

At the Lion Salt Works, coal was collected from the collieries in Staffordshire and Wigan and St Helens, Lancashire, locally called 'burgey'. [599] It was of the cheapest grade and sold at the coal pits as fit for no other purpose. Coal was generally delivered by narrow boat to the salt works from the collieries

592 Didsbury 1977, 153–154.
593 CRO D8645 LSW 90/229/14: Delivery Note, 5 March 1906.
594 CRO D8645 LSW 90/229/21: Delivery Note, 1 June 1906.
595 Calvert 1915, 495.
596 CRO D8645 LSW 90/229/121: Delivery Note, 2 October 1908.
597 CRO D8645 LSW 90/229/141: Delivery Note, 12 June 1909.
598 H F Holland quoted in Calvert 1915, 138–140.
599 Stonehouse 1853, 112.

(9.10). After the 1910s it was gradually replaced by rail transport (see below).

The barges that brought coal in would leave with salt in same hold.

Hassall's boats have gone to Colliery to load slack [low grade coal] on Monday. You load them with 8 tons S + S [7.7 grade salt], 160 sacks and balance with S + S 80 sacks in one boat and other boat Fine Clean Common Salt. [600]

9.10: A single 1910 receipt shows that coal was being shipped on board Robert Heath and Sons boats from the Biddulph Valley, Norton Colliery.

As befits salt that was essentially sent as ballast, the lowest quality salt would often be transported by the coal carriers.

Dear Sir, My boats Ted and Willie will be with you on Friday night to load on Saturday morning. Please save Friday mornings back ends Marston common [lower grade salt from the back end of the pans] for him and oblige. Yours Truly pp Thomas Hassall, [Address Ducie St, Piccadily, Manchester, Tel No 946]. [601]

During the First World War a ledger was maintained of all coal delivered to the works and salt shipped from 1914–1918. [602] It reveals that even through the war, salt continued to be delivered by river. The salt was delivered along the Trent and Mersey Canal to Anderton using the Thompson's own boats. These were given the names Ernest, Tempest, Cyclone, Duke, and Earl. The fleet of Mersey Flats, Constance, Amelia, and Gowanburn continued to be used to deliver salt to Liverpool and Weston Point.

The clients remained largely unchanged and included Braumuller and Klombie Co., A G and Co (Andrews Gillespie and Co.), and the Salt Union. A new client was TR Bower and Sons of Liverpool. Destinations included the West African markets, as well as Puerto Barrios in British Honduras (Belize), Central America and Durban in South Africa. Other salt went to the domestic fisheries market including the Weston Dock Stream Fisheries.

River transport did not decline until after the Second World War. The Constance continued to be used for orders but was increasingly prone to leaking.

Constance has made a little water since being put in the water but not much – Williamson is pleased with the small amount. The main leak was from a butt on the bend of the starboard quarter just under the light water mark (about a foot) where two plank ends had sprung from the frame fastening – they have both been bolted to the frame with screw bolts. [603]

Jonathan Thompson suggests that Jack and Alan Kinsey Thompson eventually scuppered their boats on a sand bank in Wallasey and set fire to them. [604] Parts of Constance were salvaged, in particular the mast, and were reused in the Salt Works. [605]

Rail Transport

The salt districts of Northwich began to be connected to the national rail network from the 1860s. The Midland railway's Altrincham Line was extended to Northwich in 1863. In the same year the Cheshire Lines Committee was formed from a group of companies with railway interests in Cheshire and south Lancashire. In 1867, a branch extension was opened between Lostock Gralam to the salt mines and works at Wincham and Northwich, terminating at Marston Hall mine. A further line was opened to Barons Quay works on the River Weaver and they were collectively known as the Northwich salt branches. In 1923, the reorganisation of the national railways created

600 CRO D8645 LSW 90/229/7: Delivery Note, 1 September 1905.
601 CRO D8645 LSW 90/229/9: Delivery Note, 16 November 1905.
602 LSW NOCMS: 1986/3783/3/16.
603 CRO D8645 LSW 90/412/85.
604 CRO D8645 LSW Jonathan Thompson, oral history transcript (1), *c.* 1989.
605 CRO D8645 LSW Alfred Bentley Johnson, oral history transcript, *c.* 1989.

four companies and the Cheshire railways was represented by LWR until nationalisation in 1948. Throughout this time the Cheshire Lines operated independently, and the Northwich salt branches remained in use until the mid-1960s. [606]

Rail Transport from the Alliance Works

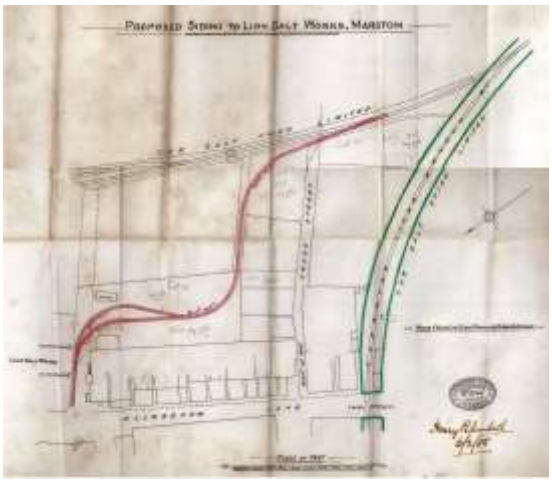
Salt was transported from the Alliance Works to the main rail network via the Northwich salt branches. The salt branches ran to the Marston Hall Mine (north-west of the LSW), The Adelaide (Open-Pan) Works (north of the Trent and Mersey Canal) and The Alliance Works which developed a series of sidings that ran into the centre of the works. From here the tramway snaked around and joined sidings in Northwich on the main Chester – Manchester line (name railway).

The Cheshire Lines Committee branch from Northwich built in 1867 split into two to serve the salt works to the north and south of the canal (9.11). [607]

9.11: The plan dated to 1893 from the Salt Union estate records shows the salt works in Marston with connections to the Northwich salt branches. The Alliance Works is centrally located south of the canal with a north-south siding.

Rail Transport from the Lion Salt Works

After the Alliance Works closed in 1905, 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 trains to use but were instead designed for coal and salt wagons that were brought up to the works using the windlass housed in the pump house from the Northwich salt branches. The wagons used to wait in sidings at the bottom end of Cross Street (the house today is called The Sidings), as noted on delivery notes:



9.12: Plan of the proposed siding that connected the Lion Salt Works to the Northwich salt branches. They ran around the southern boundary of the site and finished in front of Pan House 3 and 4. [608]

Advise Salt Union, Winsford, Van No 21 despatched to No 5 Division, Winsford for 5 ton High 160/. When loaded to be returned to Lion Salt Works Siding, Marston. [609]

A single winch is still visible in the Pump House. This was powered by the steam engine in the pump house and drew the wagons up the gradual incline from the end of Cross Street. [610] A series of pulleys and couplings are likely to have allowed the carriages to negotiate the twisting route of the siding.

Two types of wagons operated at the works.

- **Open roofed coal wagons**. See picture. These brought coal directly to the barricades of the

606 Rochester 1975, Part 3, 45.
607 CRO NPR 4459-8 1892

608 West Cheshire Museums, NOCMS : 1986.3783.4.4: Plan of proposed siding to Lion Salt Works by Cheshire Lines, February 6th 1905
609 CRO D8645 LSW 90/229/3: Reverse Delivery Note, 31 March 1905.
610 Thompson n. d. (*c.* 1985), 9.

pan houses where it was unloaded ready for use in the stoves(9.13).

- **Covered salt wagons**. The salt wagons were covered in order to protect the salt from rain. The pitched-roofed variety dates to the 1900s. Later salt wagons after the 1940s had roofs that were barrelled (9.14).

Generally deliveries were made by the Thompson's own wagons but by 1917 salt was also delivered using Verdin Cooke and Co's wagons. [611]

9.13: Open roofed wagons shown here are not original, Jonathon Thompson brought them to site for the working museum. They do indicate the type of wagon used at the works.

9.14: The 'salt van' picture above on site was brought to the works in 1992. It was originally owned by Chance and Hunt of Oldbury, but finished its working life at ICI, Winsford.

The evidence of the delivery notes from 1905 to 1910 suggests rail use was limited. Most of the orders were to regional destinations such as Liverpool and Manchester:

Please despatch one wagon of butter salt about 5 tons to Wapping Station, Liverpool. DGM. [612]

Please despatch one van 'handed squares salt', 160" x 80" [fine salt], about 5 tons to Wapping Station, L.N.W.G. Liverpool. DGM. [613]

As per telephone this morning please despatch 5 tons soiled agricultural salt to Brompton L & NW Railway to our order. Also 1 wagon of clean and dry Common Salt to Droylsden Station L & NW Railway to our order. [614]

The clients were predominantly the same as those who used the small carrier services on the canals as opposed to large scale transportation to the international export port. These included Simmonds, Hunt and Montgomery of Liverpool and Thomas Hassall in Manchester.

Messrs Simmonds, Hunt and Montgomery have sent 200 empty bags to Northwich Station, please fill them with Butter Salt as usual and despatch them to Huskisson Station, CLC [Cheshire Lines Committee] as before. [615]

As per telephone please despatch 20 tons 2nd Fishery Salt to Sutton Siding, Grimsby; also Clean Common, fine grain as before to Lower Moor Siding, Oldham in Thomas Hassall sacks. [616]

Information for the initial years of transportation is limited. During the First World War a ledger was maintained of all coal delivered to the works and salt shipped from 1914–1918. [617] This corresponded with a period when there was a transition from canal and river transport to rail transport (see 9.15, 9.16).

Coal Discharged to the Salt Works

Canal boats could transport between 24–25 tons of burgy or slack coal to the works. Rail trucks could deliver 8–9 tons of coal. Both types of coal were low grade coal. BM Burgy came from the South Lancashire, whilst slack was generally from the Staffordshire Collieries, in particular Sneyd Green.

611 LSW NOCMS: 1986/3783/3/16.
612 CRO D8645 LSW 90/229/28: 5 September 1906.
613 CRO D8645 LSW 90/229/29: 10 September 1906.
614 CRO D8645 LSW 90/229/40: 15 April 1907.
615 CRO D8645 LSW 90/229/157: 25 November 1909.
616 CRO D8645 LSW 90/229/175: 14 June 1910.
617 LSW NOCMS: 1986/3783/3/16.

In 1914, there were 110 boat deliveries and 213 wagons arrived at the works delivering 2,724 tons (2,768 tonnes) and 1,782 tons (1,811 tonnes) respectively. In the following year, 1915, very little was being delivered by boat with only 23 deliveries totalling 513 tons (521 tonnes). The graph below shows how narrow boats were replaced by rail trucks in order to deliver coal directly to the works.

The ledger records what pan the coal was delivered to, the majority going to the pans at the Lion Salt Works with only occasional deliveries of coal to the Sunbeam Works.

Salt Delivered from the Salt Works

The ledgers reveal that salt shipped by rail remained only a small percentage of the total amount of salt delivered. The vast majority continued to be shipped to the docks at Weston Point and Liverpool via the Mersey (see above). Only a small percentage got shipped by rail to support the domestic market.

Close examination of the details of these deliveries suggests that the war market in salt became altered by the needs of the war effort. The majority of the salt delivered was clean common salt, with some soiled salt. This suggests that the more refined grades of salt were seen as a luxury and not produced at this time.

In 1914, the majority of these deliveries were domestic to the Cheshire market, including Delamere Station and Cuddington Station. Other deliveries were to Crumpsall Station, Manchester and Wapping Station, Liverpool. By 1917 destinations included Cheadle Hume, Hyde Station and North Rode Station for the Mid Cheshire Farmers Association in Congleton. The latter was presumably to produce cheese for the domestic market.

By 1915, the deliveries had increased to Manchester stations including Didsbury Goods Station, Chorlton Goods Station, Levenshulme Station, Belle Vue Station, Hyde Road, Gorton Road Siding, Ardwick, Whittaker Sidings, Old Trafford and Salford Docks. The same was true of Liverpool with deliveries to Upton Station, Birkenhead and Alexandra Dock, and the potteries at Harecastle Station, Kidsgrove.

Many of the national deliveries appear to have been associated with food preservation. Deliveries to Sutton Sidings, Pyewipe, Grimsby were frequent in 1914, and these probably related to the fisheries industry. Others went to the Cold Stores Siding in Taff Vale, Cardiff and by 1918 there were regular deliveries to Spitalfields Goods Station, London, to serve the fish and meat markets in the capital. Other deliveries were to rural market places such as Ruabon Station, Market Place Station, Chesterfield, Loughborough Station and Stamford Station serving a rural food preservation market.

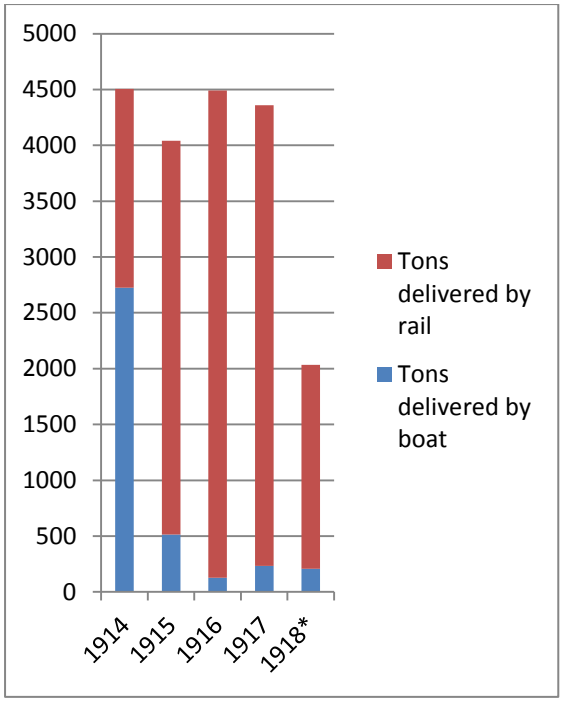
However, specific industrial purposes can be discerned. Through 1917 and 1918, there were a large number of deliveries to Dewsbury Station for chemical purposes. Soiled Salt was also being delivered to Gerard's Bridge Works, St Helens. The suspicion is that these were being used for the production of chlorine or chlorine gas and there remains the possibility it was used for the production of chemical weapons.

Salt was also being delivered to Selly Oak Station, Birmingham in 1914. Although this may have been for the domestic market, the area is associated with gun manufacture and was the location of the Birmingham Battery and Metal Company. [618] Salt could have been used in either of these industries either in the production of batteries or in the production of gunpowder. [619] The Selly Oak area had a number of gun factories that operated from the 19th century until the last few years of the 20th century. [620] By 1915, salt appears to have been used to produce chlorine once more as salt begins to be delivered to Water Street Wharf Cleansing Department, Manchester Corporation.

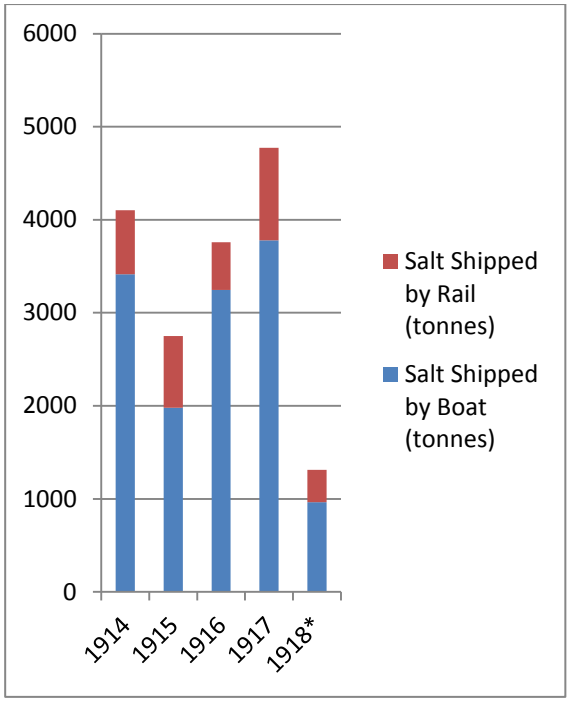
The end of the railway

The use of the rail lines appears to have ceased in the 1940s or early 1950s. By this time the Lion Salt Works would have been one of a few companies left using the Northwich Salt Lines. A dispute of the use of the sidings at the Lion Salt Works ensued.

618 Hewitson 1998.
619 LSW NOCMS: 1986/3783/3/16.
620 Hewitson 1998.



9.15: Tons of coal delivered to the Lion Salt Works, 1914–1918, based on figures provided in Ledger of fuel discharged and salt shipped. Note figures for 1918 incomplete. [621]



9.16: Tons of salt shipped from the Lion Salt Works, 1914–1918, based on figures provided in Ledger of fuel discharged and salt shipped. Note figures for 1918 incomplete. [624]

The Cheshire Lines Committee wished to charge for the use of the sidings. The Thompson's were against this:

My dear Jack, Drat this siding agreement – we have either got to have it or not – if we don't we defy them – if we do they will have it their own what because they do not approve of any suggestion we make to make it more suitable to us. However, send your letter of the 25th March 1946, Ref M20748. It is a good letter and gives ground for further argument and we shall see what they have to say. Your loving brother, Alan. [622]

The Northwich Salt Lines and railway to the salt works was eventually taken up in the late 1950s. [623]

621 LSW NOCMS: 1986/3783/3/16.
622 CRO D8645 LSW 90/412/90.
623 CRO D8645 LSW Jonathan Thompson oral history transcript (1) *c.* 1989.

624 LSW NOCMS: 1986/3783/3/16.

Road Transport

The West African trade was by narrow boat until the 1950s. From the 1950s road transport was used and salt was taken directly from the works to the docks at Liverpool using road transport. [625] Vans would back up to loading bay beside Stove House 4. Salt would be packed directly into them from the Packing Area and Stove House 2, Stove House 4, and Stove House 5 (9.17).

Joe and Geoff Cross were brothers who operated their own lorries. Over the years they took thousands of tons of [Lion Salt Works] salt to Liverpool Docks for the African countries, via the Palm Line. The salt was sent in 28lb sacks made of a special white cloth that the Africans converted to clothing. These loads did not require a crane at the Docks, and were called 'Handball' loads. 'It was just a matter of throwing the sacks off the lorry onto the top of the pile in the dock warehouse. I helped to unload these – all lorry drivers helped each other – regardless of which firm they were employed by. Sometimes the salt went directly into the hold of the ship.' [626]

9.17: An example of the lorries used in the 1950s. This lorry is part of the Murgatroyd's fleet based in Middlewich.

By the 1970s and 1980s distribution of salt to the domestic market was carried out by Harris Road Services of Griffiths Road, Lostock Gralam. On regular basis an articulated lorry would pick-up 10 tons of salt for customers in London and the South-East of England (9.18). The articulated lorries were 40 feet (12m) long, and the motor unit was another 10 feet (3m) in length, the normal payload being 20 tons. The remainder of the payload would normally be made up with orders of vacuum salt from ICI. [627]

9.18: An example of the articulated lorries during loading at the eastern side of the Lion Salt Works.

The salt was contained within printed cardboard cartons, and was a superior product. It was delivered next day. It travelled overnight with a 'trunker' [trunk road] driver to the Hatfield Depot. It was then discharged to each delivery point by a 'day shunter'. They would then reload with a load for 'up north'. [628]

625 CRO D8645 LSW Jonathan Thompson oral history transcript (2) *c.* 1989; Thompson n. d. (*c.* 1985), 9.
626 CRO D8645 LSW James Cromby, oral history transcript, 2005.
627 CRO D8645 LSW James Cromby, oral history transcript, 2005.
628 CRO D8645 LSW James Cromby, oral history transcript, 2005